

REPRODUCED AT THE NATIONAL ARCHIVES

SI-1

18

are departures from the Bureau standard methods. Also plans shall be furnished of any nonstandard (special) fixtures and appliances used.

- (3) Diagrammatic wiring plan of power and lighting systems and diagram of connections of generator and distribution switchboard as required for proper care and operation of the electric plant. (Copies also to be suitably framed and fitted on each generating set platform.) (Refer to subpar. SI-1-k-5 (a) (1).)
- (4) List of electrical weights showing manufacturer's or contractor's drawing numbers, Bureau drawing numbers, quantity, unit weights, and total weights, in pounds, of all electrical material installed, whether furnished by the contractor or Bureau. (Bureau standard form, Bureau drawing 9-S-3617-L.)
- (f) *All electrical apparatus and equipments.* (Refer to detail requirements of applicable Subsections of General Specifications for Machinery, Supplementary General Specifications for Machinery, and Navy Department specifications.)

SI-1-1. Electrical plan requirements.

1. Plans showing runs of wire leads and structural work together shall have the wire leads shown as heavy lines, and structural work (outlines of decks, bulkheads, etc.) in light lines.

2. All working deck plans and general arrangement plans showing electrical wiring, shall have all structural work shown (such as doors, hatches, skylights, stanchions, coal chutes, manholes, removable plates, together with their names and compartment numbers, etc.) which might in any way affect the run of the electrical wireways.

3. The symbols used on plans to indicate types of appliances, fixtures, etc., shall be in accordance with Bureau of Engineering standard plan 9-S-3744-L. Each plan on which appliances, fixtures, etc., are shown by a symbol, shall for convenient identification, and shall have on it a table which shall show in parallel columns each symbol used with its name and/or descriptive identification; this applies in particular to isometric and working wiring deck plans. All cables shown on plans shall be identified in accordance with Subsection S28-2. Where Bureau standard forms are available they shall be followed in the preparation of plans.

4. Working wiring deck plans shall be of $\frac{1}{4}$ -inch scale on surface vessels and $\frac{1}{8}$ -inch scale on submarines; or larger as required for satisfactory legibility. These plans shall be submitted after diagrammatic (elementary and isometric) plans have been approved, and shall show the proposed location and type of fixtures, approximate location of motors and motor generators, fans, I. C. instruments, and all other electrical apparatus, complete wiring, nature of wireways, and all appliances, such as feeder junction boxes, feeder distribution boxes, distribution boxes, switches, receptacles, etc.

5. Each system wiring plan shall have a reference plan table referring to all other plans of the system (this includes elementaries, isometrics, deck and feeder lists); this table shall list in parallel engineering numbers and alterations of each. In the case of deck plans, one of the decks (preferably Hold-Ford) only, shall bear the list of reference plans and their respective alteration numbers—in case of alteration to one of the system plans, it will therefore be necessary only to change the alteration numbers of reference plans on only this single deck plan.

6. The schedule of plans of electrical installation and the elementary diagram of the power distribution system shall be submitted at the earliest practicable date after award of contract. All power systems, lighting system, and general plans as listed in subparagraph SI-1-k-5 shall be submitted for approval in the general order stated in that subparagraph.

7. On elementary and isometric wiring diagrams and on deck plans, the extensive use of single lines to represent several cables, is unsatisfactory; a limited use of single lines for this purpose will be satisfactory. However, this shall be limited to instances where a group of leads start at one point (as at a panel or terminal board) and all proceed in the same direction to end in one general vicinity—and in these instances there should be no branches off the main single line run; wherever the single line scheme is used the leads shall be carefully labelled at each end of the single line where they are again separated.

8. All interior-communication plans shall be submitted for approval in the order stated in subparagraph SI-1-k-5 and on separate sheets. One system only shall be shown on a sheet. Additional plans which may be necessary to show special features or points not otherwise clear shall be submitted as required. Deck plans shall show general arrangement and wireways, including location of junction boxes, distribution boxes, and other principal wiring appliances. There shall be furnished sheets containing general summary of the interior-communication instruments, accessories, and wiring appliances, giving both contractor's and Bureau drawing numbers.

9. The diagrams on lists of lighting feeders and mains shall show the number of each and every circuit and circuit section (feeders, mains, submains, and branches). In this numbering care must be exercised in order to leave numbers available in sequence for each spare connection in a box (each spare on a box should be shown

REPRODUCED AT THE NATIONAL ARCHIVES

S1

19.

by a stub line). Also the deck plans shall show the number of each circuit (feeders, mains, submains, and branches) which passes through a deck, bulkhead, or barrier or out of the same compartment from which it is fed; refer to Subsection S28-2. This marking is intended to provide proper identification of the circuits, so as to facilitate the tracing of the circuit after installation.

10. The approved type B plans of the electrical installation shall be followed in making the actual installation except as modified by this paragraph and any major developments or deviations therefrom—which are approved locally by the inspector of machinery or the navy yard—shall be accompanied by immediate alteration of the approved type B plans involved to show such departures. By major developments or deviations is meant changes which if not shown would lead to confusion in checking or tracing a circuit or fittings. Since the installation as actually made will be in strict conformity with and shown in all important details on the type B plans, which will thus include all such major developments and alterations made and approved by local authority, it is contemplated that new tracings made of such type B plans will be furnished as the type D drawings required under paragraph S1-1-g. It shall be noted in particular, that on this basis it will not be necessary to make wiring deck plans from the work to show exact locations of cables, fixtures, etc.—it being considered sufficient that the wiring installation plans shall have cables, fixtures, appliances, etc., shown in the proper compartments in their approximate locations, irrespective of exact location, as is the case on the type B plans. No type D finished deck plans will be required of the interior-communication and fire-control systems. Where one set of type D finished plans are furnished for more than one vessel of a group, all major departures for any individual vessel or vessels shall be clearly indicated by notes on the basic plan, or by such supplementary plans as may be necessary if such departures are extensive.

S1-1-m. Radio drawings, special requirements.

1. Type plans, drawings of radio apparatus and its arrangements will be supplied by the Government from which contractors shall make the installations.

2. In cases when contractors supply radio apparatus, working drawings shall be submitted as may be required by the Bureau of Engineering, in the standard sizes shown in subparagraph S1-1-c-2.

S1-1-n. Symbols for electrical installation of vessels.

1. Symbols used on drawings to indicate type of appliances, etc., shall be in accordance with Bureau of Engineering plan No. 9-S-3744-L, revised to date of bid.

S1-1-o. Inspection and performance acceptance tests.

1. Unless otherwise specified, the inspections and tests made in accordance with the requirements of the applicable specifications shall be recorded in a complete test report as hereinafter stated. These reports may be made on manufacturer's or contractor's test forms, except when STANDARD FORMS (see appendix I) have been prepared by the Bureau.

2. The inspections and tests which may be required by the applicable specifications and which shall form the basis of test reports are as follows:

- (a) Separate tests of driving or driven units.
- (b) Combined assembly tests of driving and driven units.
3. For all combined assembly tests, each performance acceptance test report shall include—
 - (a) Test report of driving unit. For alternating-current motors refer to Navy Department Specification 17M10 and FACTORY TEST RECORD, Form I. N. M. 34. For direct-current motors refer to Navy Department Specification 17M9 and FACTORY TEST RECORD, Form I. N. M. 21.
 - (b) Test record of controller (if involved). For alternating-current controllers, refer to Navy Department Specification 17C10 and FACTORY RECORD, Form I. N. M. 35. For direct-current generators refer to Navy Department Specification 17M9 and FACTORY RECORD, Form I. N. M. 23.
 - (c) Test record of generators (if involved). For alternating-current generators, refer to Navy Department Specification 17G8 and FACTORY RECORD, Form I. N. M. 36. For direct-current generators refer to Navy Department Specification 17G7 and FACTORY RECORD, Form I. N. M. 22.
 - (d) Test record of driven unit, including copies of all recorded test data and characteristic curves plotted therefrom (where required).
 - (e) Test report of the combined assembled unit, including a definite report on the suitability of the driving unit (and controller, if furnished) for its specific application and harmony of assembly of all independent units going to make up the complete equipment. For motor-driven units refer to FACTORY RECORD, Form I. N. M. 34a.

REPRODUCED AT THE NATIONAL ARCHIVES

S1-1

20

4. Distribution of complete test reports on the combined assembled units shall be as follows:
- (a) Two to Bureau of Engineering.
 - (b) One to each vessel concerned (to be forwarded via inspector of machinery or commandant of the building yard).
 - (c) Two to each inspector of machinery (one for the inspector's files, the other for the shipbuilder), for privately built ships.
 - (d) One to commandant of each building yard concerned, for navy yard built vessels.
 - (e) One for primary district inspection office.
 - (f) One for branch inspection office (if any).

WADA APPROVAL
9/16/15 JS

①

FOR OFFICIAL USE ONLY

Code 415

**GENERAL SPECIFICATIONS FOR SHIPS.
OF THE UNITED STATES NAVY**
DEPARTMENT OF THE NAVY, BUREAU OF SHIPS

SI-1

1 DECEMBER 1957

**SECTION SI-1
PLANS**

Supersedes section SI-1, dated 1 July 1954

CONTENTS

Paragraph	Title	Page
SI-1-a.	Scope	1
SI-1-b.	General	1
SI-1-c.	Plan definitions	2
SI-1-d.	Government-furnished plans	2
SI-1-e.	Correspondence and plan forwarding procedure	3
SI-1-f.	Drafting and plan reproduction requirements	3
SI-1-g.	Working plans	5
SI-1-h.	Corrected plans	6
SI-1-i.	Selected record plans	7
SI-1-j.	Basic plans	9
SI-1-k.	Ship Plan Index	9
SI-1-l.	Microfilm	10
SI-1-m.	Onboard plans	10
SI-1-n.	Machinery plans	12
SI-1-o.	Electrical plans	12
SI-1-p.	Electronics plans	13
SI-1-q.	Hull plans	13
SI-1-r.	Booklet of Tank Sounding Tables	16
SI-1-s.	Booklet of General Plans	17

SI-1-a. Scope

This section contains requirements pertaining to type, preparation, approval procedure, indexing, and distribution of plans and plan booklets required under the contract. Government-furnished plans are also described.

Additional plan requirements for specific installations, structures, systems, and instruction books are contained in the applicable sections of these specifications. Specific plan requirements for machinery and equipment are contained in the referenced Government purchase specifications in the applicable section.

SI-1-b. General

Classified plans and classified correspondence relative to plans shall be designated and handled

in accordance with the security regulations referenced in section A1-0.

All plans, booklets, and indexes requiring approval shall be submitted to the Supervisor as outlined herein. Separate instructions are issued Supervisors regarding plans which the Bureau desires to review or approve prior to their granting the contractor formal approval of such plans. In general, additional prints are required of plans showing installation of equipment furnished by, or of plans of structures and systems directly associated with the proper functioning of equipment under the cognizance of the Bureau of Aeronautics, Bureau of Ordnance, Bureau of Medicine and Surgery, and the Bureau of Supplies and Accounts. In these cases, the Supervisor will designate the number of additional prints required for plan approval.

20

25

30

35

S1-1-b

2

S1-1-d

All plans, including tracings, vandykes, and blueprints, specified to be furnished by the contractor to the Bureau or its representatives shall become the property of the Government.

If defects develop in machinery and equipment during the guarantee period, and if corrections of such defects are determined to be chargeable to the contractor, he shall revise the Government's set of reproducible plans to show modifications made to correct such defects. To accomplish this, the activity to which the plans were delivered shall be requested to return them for revision; or, if preferred by the contractor, new reproducibles may be furnished to replace the incorrect plans.

S1-1-c. Plan definitions

Contract plans are Bureau plans forming part of the contract which illustrate design features of the ship from which no departure in the development of plans by the contractor is permitted unless such departure is specifically approved. They may consist of:

- Hull contract plans
- Machinery contract plans
- Electrical contract plans
- Electronics contract plans

Contract guidance plans are Bureau plans forming part of the contract which illustrate design features of the ship subject to development. These design features are acceptable to the Bureau but will not necessarily be subject to strict compliance, provided the required results are accomplished. These plans may consist of:

- Hull contract guidance plans
- Machinery contract guidance plans
- Electrical contract guidance plans
- Electronics contract guidance plans

Standard plans are Bureau plans illustrating arrangement and details of equipment, systems, or components from which no departure in the manufacture of parts or intent of use is permitted without Bureau approval. They may consist of:

- Hull standard plans
- Mechanical standard plans
- Electrical standard plans
- Electronics standard plans

Type plans are Bureau plans illustrating general arrangement of equipment, systems, or components which will be satisfactory for the Bureau's purposes but which will not necessarily be subject to strict compliance therewith as to details provided the required results are accomplished.

They may consist of:

- Hull type plans
- Mechanical type plans
- Electrical type plans
- Electronics type plans

Production plans are manufacturers' plans illustrating machinery or equipment (exclusive of electronic equipment). They consist of:

- Type I *Master plans* (Ship identification numbers are not shown because there are no features exclusively applicable to any particular ship).
- Type II *Other plans* (Ship identification numbers are shown because some part or feature is applicable only to a particular ship). These are manufacturers' working plans.

Electronic equipment and system plans are electronic equipment manufacturers' plans illustrating their equipment.

Construction plans are the contractor's plans that are necessary for construction of the ship or for illustration of the ship as constructed.

Working plans are those construction and type II production plans which are necessary for construction of the ship. They are directly associated with ship and system arrangement, fabrication, and installation. They are developed from the specifications, contract plans, and contract guidance plans.

Corrected plans are working plans which have been corrected to illustrate final ship and system arrangement, fabrication, and installation.

Selected record plans are a designated group of construction and production plans applicable to an individual ship and illustrating important features, systems, and arrangements. They are maintained correct throughout the life of the ship by the Government.

Basic plans are the design activity's plans required for all ships of a design class.

Onboard plans are a designated group of construction and production plans illustrating those features considered necessary for shipboard reference.

S1-1-d. Government-furnished plans

Contract plans and contract guidance plans will be furnished the contractor as a part of the contract. Other plans which may have been developed in conjunction with the Detail Specifications will also be furnished for the contractor's guidance if considered advisable by the Bureau.

S1-1-d

3

S1-1-i

- Upon the contractor's request to the Supervisor, the Government will furnish prints or lend tracings of Government-furnished equipment as necessary for preparation of construction or basic plans.
- Bureau standard and type plans are also available upon request, and the copy furnished will always be the one incorporating the latest revision letter. Refer to section A1-0 for effective date of revision applicable to the contract.
- The Bureau revises standard plans when advisable to incorporate improved features or processes and will consider similar modifications proposed by a contractor except those aimed primarily at modification of standard plans to suit individual shipyard shop practices.
- Lists of standard and type plans are tabulated in the following:
- | | | |
|----|--|--------------------|
| | Index of Bureau of Ships Standard and Type Plans | |
| 20 | Part 1, Hull | NavShips 250-510-1 |
| | Part 2, Mechanical | NavShips 250-510-2 |
| | Part 3, Electrical | NavShips 250-510-3 |
| | Part 4, Electronics | NavShips 250-510-4 |
- Plans fully illustrated by Government-furnished plans shall not be redrawn by the contractor. When these plans apply they shall be referenced by Bureau plan number on the applicable arrangement plan, assembly plan, or plan list.
- S1-1-e. Correspondence and plan forwarding procedure**
- The contractor shall direct correspondence concerning plans to the Supervisor as specified in section A1-0, enclosing prints of the various types of plans as outlined herein. Large shipments of the contractor's plans designated for delivery to a Government activity may be sent direct to that activity provided a list of the plans sent is enclosed; however, his forwarding letter shall be sent via the Supervisor. When a design activity is distributing basic plans his correspondence and plans shall be forwarded direct to Supervisors, Inspectors, and contractors involved in the construction of the design class and designated on a mailing order furnished by his Supervisor.
- Correspondence forwarding plans, and lists accompanying plans forwarded separately from correspondence, shall list each plan forwarded, indicate its title, Bureau plan number, and latest revision letter. Plan lists shall reference the date and serial or file number of the forwarding letter, or a copy of the forwarding letter marked for identification only may be enclosed.
- When practicable, correspondence regarding approval of plans shall be limited to the coverage of a single subject corresponding with the categories listed in Bureau of Ships Consolidated Index, NAVSHIPS 250-2702.
- Correspondence forwarding plans for approval or other action shall be separate from correspondence forwarding plans for information and file.
- When practicable, a single shipment shall be made of one type of plan (such as vandyke prints and tracings of selected record plans, or tracings of corrected plans) designated for a Government activity. For such plans the contractor shall obtain shipping instructions from the Supervisor.
- All plans shall be prepared for mailing or shipping in accordance with Mil. Spec. MIL-D-963. Blueprints shall be folded in accordance with plan, BuShips No. S0103-73906; except that blueprints of the Booklet of General Plans shall be folded as specified in paragraph S1-1-s.
- S1-1-f. Drafting and plan reproduction requirements**
- Production plans shall comply with Mil. Spec. MIL-D-963; electronic equipment and system plans shall comply with Mil. Spec. MIL-D-16415 and MIL-D-17412.
- Except where otherwise specified for a specific plan, or type of plan or plan booklet, the following shall be applicable to construction plans:
- Format.** Plans, BuShips Nos. S0103-73728 and S0103-73940 are applicable.
- In selecting the length of a plan the probable expansion of the revision column shall be considered, especially for compartment and access plans, general arrangement plans, piping arrangement plans, and others usually subject to extensive development. If practicable, the length of plans shall be limited to 144 inches.
- Titles of plans and plan booklets referred to herein shall be strictly followed. Because of possible changes in names of ships only the official identification numbers of the applicable ships shall appear on the plans.
- Titles and Bureau plan numbers of reference plans shall be incorporated on all arrangement, diagrammatic, and detail plans, if such references are necessary for a complete understanding of the plan.
- If the required information cannot be included on one plan as many sheets as necessary may be used, provided each sheet is the same size and has the same complete title and plan number.

S1-1-g

6

S1-1-h

representative; likewise, no revision is valid until it bears his initials in the appropriate place in the revision block. After each approval, prints shall be forwarded to the Supervisor for his distribution and file. In general, three prints of each plan shall be forwarded, but for certain plans, additional blueprints or vandyke prints will be required and shall be furnished by the contractor in the number specified by the Supervisor. When the contractor is required to furnish basic plans; additional prints and reproducible shall be furnished as specified in paragraph S1-1-j.

When submitting plans for approval the contractor shall invite specific attention to all departures from contract plans, or from requirements of the General Specifications or the Detail Specifications. He shall describe in detail those departures which he considers to involve a change under the contract; otherwise, general approval of his plans shall not constitute approval of the departures. Reasons for all departures from contract plans and specifications shall be given.

Approval of a plan shall not be construed as approving items not germane to the subject of the plan as stated in the title unless specific action on such items is requested. This requirement shall not be interpreted as cause for complicating the plan title.

Approval of a detail, such as the electric equipment of an auxiliary, shall not be construed as implying approval of the auxiliary itself or the general system with which it operates. Approval of an arrangement or outline plan does not indicate approval of any detail.

If after a plan of any arrangement or detail has been approved and the same arrangement or detail is shown differently on any plan subsequently submitted, approval of the latter plan shall not be construed as approving any deviation from the former plan unless approval of such deviation is requested.

If new plans are submitted which supersede or supplement previously submitted plans in whole or in part, reference to the superseded or supplemented plans shall be made on the new plans, and vice versa. Explanatory notes regarding main differences or supplementary information regarding the superseded or supplemented plans shall be shown on the new plans or outlined in the correspondence when submitting the plans for approval.

Piping, ventilation, heating, and air conditioning.—Other sections of these General Specifications outline specific requirements for piping, ventilation, heating, and air conditioning

diagrams. Working plans of these diagrams shall be submitted for approval prior to submission of arrangement plans of the systems. Refer to sections S1-5 and S88-1 for use of these diagrams in instruction books.

Stress diagrams.—When stress diagrams are specified to be furnished the plan shall incorporate the following data:

Working load, test load, assumption as to manner of loading (i.e., live, dead, alternating), assumed friction, materials (including specification number), maximum stresses in each part (compressive, tensile, shearing, bearing, and torsional) developed by the working load, and the factor of safety (see section S11-0), in each part.

Stress diagrams shall also give information regarding characteristics under dynamic loadings, when applicable. This shall include calculations for natural frequencies of vibration and for resistance to shock loadings, together with pertinent data.

Stress diagrams shall be submitted in a complete and rational form so that a reviewer can follow through the work, step by step, without difficulty. Pertinent work sheets, such as for the calculation of section modulus of an irregular section, shall be submitted with the stress diagram. The format of these work sheets may be of any form convenient to the contractor.

Refer to section S48-0 for stress diagrams required for piping installations.

S1-1-h. Corrected plans

General requirements.—Working plans shall be used in the preparation of corrected plans for the Bureau. They shall be furnished in the following manner:

If all ships of a design class are built at one shipyard, one complete set of plans shall be furnished by the contractor. Should a plan not apply either in whole or in part to all ships of the class, such plan shall be properly marked for the applicable ships, or additional sketches incorporated thereon to indicate the differences; and if this is impracticable, a separate plan for each ship shall be furnished.

If ships of the same design class are built at more than one shipyard from basic plans, each contractor shall furnish a corrected plan, properly marked for the applicable ships, incorporating all revisions made by him for each deviation from the basic plan which effects replacement and repair. Each such plan shall be assigned a new

SI-1-h

7

SI-1-i

	Bureau plan number and shall carry a note reading: <i>This plan developed from Basic Plan, Bu-Ships No. . . if he has not deviated from the basic plan to the extent mentioned above, no corrected plan need be furnished.</i>	
5	Corrected plans need not be furnished for diagrams which form a part of instruction books nor for those plans required to be Selected Record Plans.	
10	When selected record plans are not required (see paragraph SI-1-i), plans of the same scope and title shall instead be furnished as corrected plans as specified herein.	
15	<i>Preparation.</i> -- All corrected plans shall be hand-inked or photographically reproduced cloth tracings, or they may be the original hand-inked cloth tracings. They shall be suitable for producing legible prints and satisfactory microfilm.	
20	Any information or sketch not on the plans, the lack of which would prevent fabrication, manufacture, or reordering of parts, shall be incorporated on the corrected plans. Any sketch or miscellaneous information not applicable to the equipment or part shown shall be removed.	
25	<i>Approval and marking.</i> -- Before distributing tracings the contractor shall have them examined by the Supervisor to ascertain that they comply with all requirements. When found correct they shall be stamped or marked Corrected Plan in the location shown on plan, BuShips No. 50103-73728.	
30	<i>Distribution.</i> -- Unless otherwise stated in the contract, each contractor shall furnish corrected plans within four months after all ships of the design class built at his yard have been delivered to the Government. The destination to which the plans are to be delivered shall be as directed by the Supervisor. Plans shall be forwarded as a single shipment (except that classified plans shall be forwarded as a separate shipment), and they shall be accompanied by a list as specified in paragraph SI-1-e. The forwarding letter shall state that all plans have been certified correct by the Supervisor. If a contractor has been using basic plans, his forwarding letter shall also state that the plans enclosed are the only ones applicable to the ships concerned which differ from the basic plans as effecting replacement or repair.	
35		
40		
45		
	SI-1-i. Selected record plans	
50	<i>General requirements.</i> -- Except as otherwise specified in this paragraph, one complete set of selected record plans shall be furnished by the contractor for each ship of the following types:	
	Aircraft carriers	
	Battleships	
	Cruisers	55
	Destroyers	
	Submarines	
	For ships other than the above-listed types, the only selected record plans required are the docking, booklet of general plans, and the running, signal and anchor lights location plans. Separate docking, booklet of general plans, and running, signal and anchor lights location plans shall be furnished for each ship of each class. In addition, corrected plans, in accordance with paragraph SI-1-b, shall be furnished for the items listed below (other than the docking, booklet of general plans, and running, signal and anchor lights location plans) in lieu of selected record plans.	60
	Onboard prints of these plans shall be furnished as specified in paragraph SI-1-m regardless of whether they are furnished as selected record plans or as corrected plans.	65
	Plans covering the following items shall be designated Selected Record Plans:	70
		75
	SURFACE SHIPS AND SUBMARINES	
	Antenna systems, topside arrangements	
	Booklet of General Plans	
	Docking plan	80
	Electric equipment, arrangements in all ship and fire control spaces.	
	Electronic equipment, arrangements in all electronics main operating and control spaces (if not shown on other arrangement plans)	85
	Electronic systems, isometric wiring diagrams	
	Electronic systems, elementary wiring diagrams (including remote control systems but not including individual electronic equipment system diagrams)	90
	Fire control systems, isometric and elementary wiring diagrams	
	Interior communication systems, isometric and elementary wiring diagrams	95
	Lighting systems, working wiring deck plans (if these plans do not show all feeders and mains the contractor shall furnish instead the isometric wiring diagrams of the ship service and emergency lighting systems)	100
	Running, signal and anchor lights location plan (outboard profile of ship showing exact locations of all lights including searchlights)	
	Machinery, arrangements in main and auxiliary spaces (except small pump rooms, workshops, and steering gear rooms)	105
	Steering gear control system, diagrammatic arrangement	

SI-1-i

8

SI-1-i

Switchboards, I. C. and F. C. (wiring diagrams, single line or elementary, and front views only)

5 **SURFACE SHIPS ONLY**
Booklet of Tank Sounding Tables
Emergency power system, isometric wiring diagram

10 Power distribution system, elementary wiring diagram

Rigging, general arrangement
Ship service power system, isometric wiring diagram

15 Schedule of watertight integrity tests and inspections

Tank capacity curves and curves of vertical center of gravity

Telephones, list of sound-powered and dial types

20 **SUBMARINES ONLY**
Compartments and tanks, testing requirements

25 Escape and rescue arrangements
Lighting system, list of feeders and mains
Moment diagram
Propulsion power system, schematic diagrams

30 Propulsion power system, working wiring deck plans

Salvage system, arrangement
Ship service power system (a. c. and d. c.), working wiring deck plans

35 Ship service power system (a. c. and d. c.) list of feeders and mains

Snorkel system, arrangement
Stowage, lead ballast

40 Tank capacity curves, curves of center of gravity and curves of moment of inertia

The contractor, utilizing the above, shall prepare a list of selected record plans, giving title and plan number of each plan. This list shall be approved by the Supervisor. For a design class, the design activity shall distribute this list to all following yards.

45 **Preparation.**-- Plans and plan booklets shall be hand-linked or photographically reproduced cloth tracings. Each selected record plan shall show the official number of that ship only. Separate Bureau plan numbers shall be assigned each plan for each ship.

Approval and marking.-- All selected record plans shall be examined and approved by the

Supervisor. When found to be correct they shall be stamped or marked **SELECTED RECORD PLAN** in the location indicated on plan, BuShips No. S0163-73728. As each selected record plan is completed, the last revision shall indicate that the plan has been checked against the ship and corrected to show conditions actually existing on that ship.

Distribution.-- Selected record plans shall be completed by the contractor as soon as practicable, preferably by the time the ship has reached the outfitting activity, but in no case later than three months after delivery of the ship for which the plans are applicable.

When completed, tracings of all selected record plans shall be forwarded by the contractor to the outfitting activity via the Supervisor. These tracings shall represent the ship as delivered and shall terminate the contractor's responsibility regarding these plans except as noted in paragraph SI-1-b, or where his contract specifies fitting-out the ship.

If it is impracticable to furnish all tracings of selected record plans to the outfitting activity at the time of delivery of the ship, the contractor shall furnish those completed and for the remainder he shall furnish vandyke prints of working plans which the contractor will either convert to or which he will use as a basis for preparing the remainder of the selected record plans. These prints will be used by the outfitting activity in lieu of selected record plans until the tracings are furnished by the contractor.

As soon as practicable, and in any case before the ship leaves the building yard, the contractor shall furnish one vandyke print of the docking plan to the Bureau, one to the outfitting activity, and one to the Commanding Officer of the ship. In addition, a reproducible shall be furnished to the Supervisor for reproduction and distribution.

When selected record plan tracings are transferred to the outfitting activity the contractor shall furnish the Bureau with reverse-reading paper vandykes of the Booklet of General Plans and direct-reading paper vandykes of the remaining selected record plans.

If the contractor is designated as the outfitting activity he shall incorporate on the selected record plans all revisions found to be necessary in the fitting-out. He shall furnish the Bureau with a reverse-reading paper vandyke of the Booklet of General Plans and one direct-reading paper vandyke of each other selected record plan. He shall

51-1-i

9

then forward the tracings to the naval shipyard designated by the Bureau as the planning yard.

51-1-j. Basic plans

5 *General requirements.*—This paragraph outlines the responsibilities of a design activity for the preparation and distribution of basic plans and the responsibilities of leading and following yards in their use of these plans. If a design activity is not designated, the leading yard shall assume the responsibilities of the design activity as outlined herein unless otherwise stated in his contract.

10 If both a design activity and a leading yard are specified in the construction of a design class, the plan responsibilities outlined herein for a following yard are applicable to the leading yard except as noted. Plan requirements in connection with trial work or other special assigned tasks will be as specified in section A1-0.

20 Furnishing of basic plans shall include the preparation, submission for approval, certification, and distribution of all plans which are necessary in the construction of a design class and which are applicable to the entire class when drawn.

25 The design activity shall furnish basic plans. Following yards shall use basic plans in the construction of ships built at their shipyards. They shall furnish prints of onboard plans and when required, tracings of corrected plans and selected record plans prepared from basic plans supplied by the design activity.

30 *Preparation and marking.*—The design activity shall develop and prepare basic plans in the manner prescribed in the appropriate paragraphs of this section describing the various types of plans. All plans shall be titled to indicate all ships of the design class authorized when plans are drawn. Since reproductions of these plans may subsequently be revised or new plans drawn which would supersede them insofar as particular ships are concerned, they shall be conspicuously marked or stamped at time of submission for approval: *See Ship Plan Index for verification or applicability of this plan to any ship.*

45 *Approval procedure.*—The design activity shall obtain approval of basic plans from its Supervisor in the manner prescribed in the appropriate paragraphs of this section describing the various types of plans.

50 A following yard may make minor revisions to working plans to suit local conditions. In such instances, and for new plans such as corrected plans and selected record plans prepared from

51-1-k

basic plans, approval shall be obtained from the Supervisor of the following yard.

55

When both a design activity and a leading yard have been specified, the following additional responsibilities are applicable:

The leading yard shall forward to the design activity, after approval by the Supervisor of the leading yard, prints of all new and revised plans which differ from basic plans.

60

The design activity shall review all new and revised plans forwarded by the leading yard, incorporate on the basic plans those revisions which it considers applicable to the design class, and submit them to its Supervisor for approval.

65

Distribution.—Distribution of prints and tracings of basic plans by the design activity to its Supervisor shall be as specified in the appropriate paragraphs of this section describing the various types of plans. The design activity shall distribute prints of new and revised plans to Supervisors of following yards in quantity sufficient to satisfy their file and distribution requirements. To each following yard the design activity shall forward one vandyke or one ozalid print, whichever is requested by the following yard, of each new and revised plan.

70

75

Plans shall be distributed as soon after approval as practicable. Production plans necessary in construction of the design class shall be distributed also; except that detail type I plans need not be distributed unless they are required for reference or for reproduction of onboard plans.

80

85

After completion of all ships of the design class, and arrangements for microfilming of plans have been made, the design activity shall forward to the Bureau the original ink tracings, or photographically reproduced cloth tracings, of all basic plans.

90

51-1-k. Ship Plan Index

Definition and use.—The Ship Plan Index, referred to herein as the SPI, comprises a list of plans, together with the latest applicable revision of each, that apply to an individual ship or a specific group of ships.

95

General requirements.—For ships having an overall length of less than 200 feet, one SPI shall be prepared by each contractor to list plans applicable to all ships of a design class built at his shipyard.

100

For ships having an overall length of 200 feet or more, one SPI shall be prepared for each ship.

105

SI-1-k

10

SI-1-m

Content and preparation.-- Except for Bureau standard and type plans, detail and subassembly type I production plans, all plans under the cognizance of the Bureau of Ships, including plans of Government-furnished material, and applicable to the ship(s) concerned, shall be listed in the SPI.

The SPI shall show the title, Bureau plan number, latest revision letter, and the contractor's or manufacturer's plan number of each plan listed. On the left-hand edge of each page an asterisk shall be placed opposite each onboard plan. Manufacturers' plan lists or assembly plans included in the SPI, which list some or all of the detail and subassembly plans furnished as onboard plans which are not included separately in the SPI, shall be indicated by a double asterisk. The cover sheet of the SPI shall contain the following notation regarding onboard plans:

ONBOARD PLANS.

*Plan furnished ship.

**Plan furnished ship, including some or all detail and subassembly plans not listed in this index.

The SPI shall be prepared on reproducible paper forms. Copies of these forms will be furnished the contractor by the Supervisor. The data may be typed on the SPI provided sheets are carbon-backed to permit greater legibility of reproductions. Reproducible copies furnished following shipyards shall have the plan revision letters deleted, as these shall be inserted by each contractor to correspond with his final plans. Each contractor shall correct his copy of the SPI to show the applicable list of plans at time of delivery of the ships concerned.

As far as practicable, all plans shall be listed in numerical sequence according to their functional 3-digit index number (NAVSHIPS 250-2702) appearing in the plan number. Within the same index number category, related plans shall be grouped together. Where the plan content includes components that have subordinate index categories, as determined by notes on the plan, the plan shall be listed again in the SPI under each 3-digit index number exemplifying the subordinate category. Plans not having a 3-digit index number, or having an S-group number, shall be listed in the SPI under the 3-digit number corresponding to each shipboard application.

Distribution.-- All SPI's shall be distributed in the same manner as described for selected record plans.

SI-1-l. Microfilm

As soon as practicable after delivery of the ship to the Government, the contractor shall furnish microfilm indexes and one print of each plan listed therein for microfilming by the Government. The Supervisor will specify to which Government activity these indexes and prints shall be sent. Plans and indexes shall be forwarded as a single shipment and a copy of the forwarding letter shall be sent the Bureau.

The microfilm indexes shall comply with MIL Spec. MIL-D-18051. Prints shall be black line on white background and shall be clear and sharp. If plans of Government-furnished equipment are not available at the contractor's shipyard, prints will be furnished by the Bureau upon request. If the contractor cannot furnish all prints because some plans are not available at the time, he shall list each such missing plan by its Bureau number and title in the forwarding letter.

Prints shall be assembled in the same order as they are listed in the microfilm index and rolled into bundles not exceeding nine inches in diameter. Bundles shall be marked on the outside to indicate the page numbers of the microfilm index on which the plans are listed. Plans shall be rolled from left to right so that the titles will appear first when unrolling.

When several ships of a design class are being constructed, microfilm indexes and prints will be required for the first ship of the class only. In this case the design activity shall prepare and furnish the microfilm indexes and shall be responsible for arranging for the forwarding of prints for microfilming.

Microfilm indexes and prints forwarded for microfilming shall become the property of the Government.

SI-1-m. Onboard plans

This paragraph covers the contractor's responsibilities regarding the furnishing of onboard plans for each ship. Separate instructions are issued Supervisors regarding such items as the allowance list and the tonnage certificate that are furnished for the ship's file in addition to the plans furnished by the contractor. Plans of internal combustion engines, in the form of microfilm, will be furnished by the Bureau. For instruction books and the Damage Control Book refer to sections SI-5 and S88-1.

Requirements for surface ships.-- For selection of onboard plans, the following list shall be

SI-1-m	11	SI-1-m
used as a guide for all surface ships except service craft:		Selected record plans (or their equivalent in the form of Corrected Plans, see SI-1-i.) 55
Air testing fittings, list of (if not included in the Schedule of Watertight Integrity Tests and Inspections).		Ship Plan Index.
5 Aircraft and boat stowage and handling arrangements.		Stern gates.
Ammunition, stowage, and handling, arrangements.		Stern tube stuffing box.
10 Bow doors.		Zincs in machinery installations, check-off list. 60
Bow ramps.		Except as noted below, one blueprint of each plan required by the above list shall be furnished as onboard plans:
Capacity plan (for cargo and supply type ships).		Prints need not be furnished of those plans included in an instruction book specified in section SI-5. 65
15 Closure classification label plates, list of.		Additional prints, in number specified by the Supervisor, shall be furnished of the Ship Plan Index, Booklet of General Plans, Booklet of Tank Sounding Tables, Schedule of Watertight Integrity Tests and Inspections, docking and berthing plans, and other important plans depending upon the type of ship. 70
Degaussing, elementary and isometric wiring diagrams.		For service craft, onboard plans shall be limited to diagrammatic and general arrangement plans considered necessary by the Supervisor. 75
Fueling at sea, arrangement.		Requirements for submarines. - For selection of onboard plans, the following list shall be used as a guide: 80
Gaskets and packing, list of.		Ammunition stowage; handling, and launching arrangements.
20 General arrangement plans of all decks, levels, and platforms.		Closure classification label plates, list of.
Ladder, accommodation, stowage and handling arrangements.		Degaussing, elementary and isometric wiring diagrams. 85
Lubricants; list of.		Gaskets and packings, list of.
25 Machinery:		Hydraulic rams for bow and stern diving and steering systems.
(1) General assembly.		Lubricants, list of.
(2) Subassembly of major components.		Machinery: 90
(3) Operating, control, and lubrication diagrams.		(1) General assembly.
30 (4) Equipment and procedure for evaporator tube nest removal.		(2) Subassembly of major components.
(5) Other detail plans (for ships 200 ft. in length and larger) that are considered necessary by the design activity preparing the Ship Plan Index to supplement information contained in the instruction books.		(3) Operating, control, and lubrication diagrams.
35 Missiles, launching arrangements.		(4) Other detail plans that are considered necessary by the design activity preparing the Ship Plan Index to supplement information contained in the instruction books. 95
Paravane installation.		Operating gear affecting the submersibility of the submarine, arrangement and details: 100
Piping arrangement plans in all main and auxiliary machinery spaces.		Periscope hoist cylinders.
40 Pipe hangers for main steam piping.		Propellers.
Power system wiring deck plans.		Propulsion shafting arrangement and details.
Propellers.		Propulsion shaft bearings (including strut, stern tube, line shaft, and propeller thrust bearings). 105
Propulsion shafting arrangement and details.		Selected record plans.
45 Propulsion shaft bearings (including strut, stern tube, line shaft, and propeller thrust bearings).		
Propulsion turbines and gears (all assembly and detail plans, including lifting arrangements; except for ships less than 200 ft. in length where assembly, outline, and clearance plans only shall be furnished).		
50 Replenishment at sea, arrangements.		
Rudder and rudder bearings.		

S1-1-m

12

S1-1-o

Ship Plan Index.
Snorkel systems (including safety circuits and devices).

Stern tube stuffing box.

5 Zincs in machinery installations, check-off list:

Onboard plans need not be furnished if they have been included in an instruction book specified in section S1-5.

10 Except for the Booklet of General Plans, the Ship Plan Index, and the docking plan, for which one or more full-size blueprints are required, one photographically reduced positive blueprint of each plan required by the above list shall be furnished in booklet form as follows:

15 The trimmed width of plans shall be twelve inches and the minimum length twenty inches. Prints of longer plans shall be folded to dimensions of 12 by 23 inches. Prints shall be inserted in strong 13 by 21 inch loose-leaf binders in numerical sequence corresponding to the serial number of the Bureau plan number.

20 The front binder shall show the ship's official identification number, inclusive Bureau plan numbers in the booklet, and the title on-board plans. The front binder shall be hinged near its left hand edge and again approximately ten inches from its right hand edge so that it can be folded over for examination of a whole plan or for examination of title blocks only.

25 One or more booklets shall be furnished, as required, to limit the maximum thickness of each to 2-inches.

30 The photographic negatives, necessary to produce the reduced size plans, shall be furnished to the Bureau as Government property.

S1-1-n. Machinery plans

40 Plans of all machinery details, arrangements, systems, and outfit necessary for execution of the work and all booklet plans and special plans described in these specifications shall be furnished by the contractor unless otherwise specified. Supplementing the basic requirements of other paragraphs of this section and specific plan requirements in other sections of these specifications the following is applicable to all machinery plans.

50 Generally all machinery plans are drawn to scale. Diagrams, preliminary sketches, and other plans which cannot be misinterpreted because of lack of scale may be drawn without a definite scale provided the concept is clear. Where practicable such plans shall show machinery and im-

portant equipment in proportion to size, and where shown within the boundaries of ship's outlines, in positions approximating their physical locations.

Machinery and piping arrangements shall be drawn to scales of not less than $\frac{1}{4}$ inch to the foot and larger scales are recommended where their use will not unduly increase the size of the plan. Where practicable, all machinery and piping arrangements for the same design class shall be drawn to the same scale.

65 In general, machinery arrangement plans shall also show major items of electric equipment, including main wireways, to insure against interference between mechanical and electrical components and to expose undesirable conditions where by fluids from piping systems or moisture from ventilation ducts could be directed on electric equipment or main wireways. Machinery arrangement plans shall also show other pertinent features such as tube removal space outlines, ladder landings and accesses, large piping such as main injection and discharge piping, main and auxiliary sea connections and valves, permanent lifting gear and trolley arrangements. Main and auxiliary machinery shall be identified by the nomenclature specified in sections S28-1 and S28-2 and machinery compartments identified in accordance with section S28-3.

S1-1-o. Electrical plans

Plans of electrical details, arrangements, systems, and outfit, booklet plans and special plans required by these specifications shall be furnished by the contractor unless otherwise specified. Supplementing the basic requirements of other paragraphs of this section and the specific plan requirements in other sections of these specifications, the following shall be applicable to all electrical plans.

Plans showing both runs of wiring and structural work, such as outlines of decks and bulkheads, shall have the wiring runs shown in thick lines and the structural work shown in thin lines.

Symbols used on plans to indicate type of appliances and fixtures shall comply with BuShips Standard Electrical Symbol List NAVSHIPS 250-560-3. Each plan on which equipment, appliances, and fixtures are shown by a symbol shall have on it a table which shall show in parallel vertical columns each symbol used and its name or descriptive identification. Cables shown on plans shall be identified in accordance with section S28-2.

SI-1-o	13	SI-1-q
<p>Elementary wiring plans need not be to scale. Isometric plans shall be drawn to a scale suitable for clarity. They shall show structural outline necessary to illustrate cable runs relative to main compartmentation.</p>	<p>thick lines and structural work, such as outlines of decks and bulkheads, in thin lines.</p>	55.
<p>Interior communication, fire control, and navigation system isometric drawings shall have the conductor markings as described in paragraph S28-2-f shown for each cable along with the cable identification markings.</p>	<p>Symbols used on plans to indicate type of appliances and fixtures shall comply with BuShips Standard Electrical Symbol List NAVSHIPS 250-568-3. Each plan on which equipment, appliances, and fixtures are shown by a symbol shall have on it a table which shall show in parallel vertical columns each symbol used and its name or descriptive identification. Cables shown on plans shall be identified in accordance with section S28-2. Items of electronic equipment shall be identified on all plans by their assigned nomenclature and model, or type number designation.</p>	60
<p>Working wiring deck plans shall be drawn to a scale of 3/8 inch to the foot for submarines. For surface ships the scale may be either 1/4 inch or 3/8 inch to the foot.</p>	<p>Elementary wiring plans shall show and identify the source of electric power, such as the distribution panel or switch box. These plans need not be drawn to scale.</p>	65
<p>Working wiring deck plans and general arrangement plans showing electric wiring shall also show structures which may affect the run of electrical wireways. Doors, hatches, scuttles, manholes, and removable plates shall be shown.</p>	<p>Isometric plans shall be drawn to a scale suitable for clarity and shall indicate and identify all associated structural compartments.</p>	70
<p>Wiring deck plans shall be submitted after diagrammatic (elementary and isometric) plans have been approved, and shall show the proposed location and type of equipment. Wiring shall be shown as required by sections S62-0 and S64-1. power and lighting deck plans and interior communications and fire control isometric diagrams.</p>	<p>Elementary and isometric wiring plans of electronic equipment and systems shall be submitted after equipment arrangement plans have been approved.</p>	75
<p>Each system wiring plan shall have a reference plan table referring to all other plans of the system, such as elementary and isometric diagrams, deck plans, and feeder lists. This table shall list in parallel vertical columns the contractor's plan number, the Bureau plan number, and the title of each referenced plan. One of the deck plans shall have a similar table of reference plans.</p>	<p>The contractor's electronic equipment arrangement plans shall show structure, ventilation, rigging, and all other equipment and systems that may affect the equipment installation. The scale to which these plans are drawn shall be as large as necessary for clarity, generally one inch to the foot, except for topside antenna arrangements which may be as small as 1/4-inch to the foot.</p>	80
<p>SI-1-p. Electronics plans</p>	<p>Each system wiring plan shall have a reference plan table referring to all other plans of the system, such as elementary and isometric diagrams. This table shall list in parallel vertical columns the contractor's plan number, the Bureau plan number, and the title of each reference plan.</p>	85
<p>Plans of all electronics arrangements, systems, and outfit necessary for execution of the work and all special plans described in these specifications shall be furnished by the contractor unless otherwise specified. When electronic equipment is furnished by the contractor he shall furnish plans in accordance with Mil. Spec. MIL-D-17419 and MIL-D-16415. Supplementing the basic requirements of other paragraphs of this section and the specific plan requirements in section S67-0, the following shall be applicable to all electronics plans.</p>	<p>SI-1-q. Holt plans</p>	90
<p>Plans showing both runs of wiring and structural work shall have the wiring runs shown in</p>	<p>Plans of all hull structures, arrangements, systems, and outfit necessary for execution of the work and all booklet plans and special plans described in these specifications shall be furnished by the contractor unless otherwise specified. Supplementing the basic requirements of other paragraphs of this section and specific plan requirements contained in other sections of these</p>	95
		100

SI-1-s	18	SI-1-s
	Draft, above bottom of keel corresponding to full load displacement	
	Draft, above lowest projection below keel corresponding to full load displacement	
5	Heights of masts; periscopes, navigational lights, masthead lights, rotating antennas, bridges, and elevated platforms	
	List of small boats	
	Capacity of booms and cranes	
10	Accommodations showing ¹	
	Berths (total number for flag officers, ship's officers, warrant officers, chief petty officers, crew, marines, troop officers, troops, and passengers)	
15	Lockers (total number for noncommissioned ratings, except lockers, type D, plan, BuShips No. S3305-860192)	
	Cribs (number on dependent transports)	
20	Table showing capacity of all tanks in gallons and also in tons of salt water, fresh water, or oil as applicable (for submarines only)	
	Outboard profile (where essential differences exist in port and starboard sides of ship both sides shall be shown) ²	
25	Inboard profile	
	Bridges and boat stowage	
	Decks (a plan of each deck and platform) ³	
	Hold	
30	Bottom compartments	
	Inner bottom	
	Midship and type sections, indicating scantlings and details of construction, and molded heights of decks above the base line.	
35	Preparation.—The ship's contract plans and contract guidance plans and the Detail Specifications, with approved modifications to date, shall be followed in the preparation of the first draft of the booklet. As further information becomes available the contractor shall revise the booklet accordingly.	
40		
	¹ Quantities shall be the total for each item as shown in berthing arrangements for wartime conditions.	
45	² Horizontal distances between all masts, heights above the load waterline of all masts, navigational lights, bridges, and elevated platforms, and the distance of antennas below top of mast shall be shown by figured dimensions.	
50	³ Replenishment at sea stations (fuel and cargo) shall be shown on the appropriate deck plan, including type of replenishing gear installed and size of filling connections.	
	The following drafting requirements shall be followed in preparation of plates for the booklet.	55
	Installations such as guns, loading machines, berths, furniture, and chains, shall be delineated only as necessary for clear understanding using straight-line outlines and labeling.	
	Detail of masts, stanchions, and rigging, where a clear understanding of the actual installation may be obtained otherwise, need not be shown. Hinging of stanchions and swing of airports need not be shown.	60
	Detailed arrangement of spaces is not desired except to show use or occupancy. In crew living spaces the outline of berths, number of men berthed, number of lockers, or other accommodations provided in each space shall be shown. Plan views of decks and levels shall show arrangement of spaces for peacetime operations. A separate plan view of spaces which will be converted to living or other use when STRIP-SHIP takes effect shall be included on the plan of the deck or level concerned to show arrangement under wartime conditions. General arrangement of furniture and equipment in officer quarters, offices, and similar spaces shall be shown where practicable, and in as little detail as practicable. Berths shall be marked single or double. Furniture, such as chairs or similar small articles, shall not be shown.	65
	All compartments shall be designated by compartment number (surface ships only), and by name. Spaces such as staterooms and offices shall be designated by number and name if assigned. The following shall be indicated:	70
	Airports—Trace on deck plans and outboard profile	
	Ammunition hoists—trace on deck plans; number hoists at upper and lower terminals	75
	Ammunition passing scuttles	
	Anchor	
	Antennas, radio and radar	
	Appendages, major; such as struts and bilge keels	80
	Arches in bulkheads	
	Armament—outline, location, number, size (bore) of gun	
	Arresting gear deck pendants, deck sheaves, barriers, and barrier wires	85
	Auxiliary machinery—outline of major auxiliaries only	
	Awnings—extent of	
	Bake shops—outline of ovens, proofers, dough troughs, and mixers	90
	Bell, ship's	
		95
		100
		105

51-1-s	19	51-1-s
	Berths	Messing-outline of serving tables and number of men that can be seated in each messing compartment 55
	Bilge keels	Mine or depth-charge tracks or sails--outline
	Binnacle--with fixed and movable non-magnetic material circles	Mooding bitts
5	Bitts	Motors--outline and number 60
	Blowers, forced draft--major outlines only	Offices--outline of desks, large cabinets, lockers, and tables
	Boat booms	Propeller lifting 'padeyes
	Boats, giving length and type	Propellers--on outboard profile and hold plan (with outline showing maximum beam and propeller guards on hold plan in way of propeller)
10	Boilers--outline and access	65
	Bulkheads	Propulsion shafting on outboard profile and hold plans
	Capstans	Range finders 70
	Catapults	Refrigerated storerooms
	Chain pipes	Replenishment at sea stations--outline of landing areas
	Chairs, bridge wing and pilothouse	Rigging, standing 75
15	Compartments--all; identification number and use	Rudder
	Control spaces--outline	Searchlights
	Cowls	Side ladders
	Cranes, cargo booms and other weight handling devices	Signal balyards
20	Davits	Smoke pipes
	Dental spaces--outline of large equipment	Spars 80
	Diving planes	Staterooms--outline and number of berths and detail or mess assignment
	Docking keels	Steering gear--outline
25	Doors--location and swing	Stiffeners on main structural bulkheads
	Ducts, ventilation--plan view, major only	Storerooms--allocation 85
	Dumbwaiters	Struts, shaft
	Elevators	Tanks, fresh-water, gravity and pressure
	Escape scuttles	Towing machine--outline
30	Fans, ventilation, major	Towing pads
	Fenders	Trunks--plan view, principal 90
	Frame, web-trace on deck plans	Turrets--outboard profile and plan outline
	Frame numbers--all plans, each fifth frame	Uptakes
	Furniture--outline of berths, officer and CPD messing tables, office desks	Washrooms--list of lavatories and showers
35	Galley--outline of ranges, kettles, and dressers	Water closet spaces--list of seats and urinals 95
	Generators--outline and number	Wildcats
	Gypsy heads	Winches--outline and number
40	Hatches	Windlass--outline
	Hawsepipes	Windows
	Hospital spaces--outline and number of berths, cabinets, lockers, and other large items	Windshields 100
	Ladders--vertical and inclined	In connection with the preparation of midship and type sections, the following shall apply:
45	Laundries	Scale shall be 1/2 inch to the foot. A scale of 1/8 inch to the foot may be used wherever necessary to reduce the size of individual sheets to permit inclusion, without folding, in the booklet. 105
	Life buoys	
	Light traps	
	Lookouts, sky and surface	
	Machinery--outline of engines, turbines, generators, and access	
50	Magazines--kind of ammunition stored only	
	Manholes	
	Masts, spars, and booms	

51-1-s

20

51-1-s

- Armor shall not be indicated, but the outline of armored structures such as protected pilothouse, barbettes, internal armor, and armored bulkheads, shall be indicated by a single line of normal thickness.
- Scantlings and methods of construction of special treatment steel structures comprising plating of less than 60 pounds per square foot shall be shown.
- Where an armored deck consists of a single course, only a single deck of normal structural thickness (but without dimension) shall be shown.
- For two-course armored decks only the under (strength) course with correct scantlings, where plating is less than 60 pounds per square foot, shall be shown.
- Details of torpedo protection systems as used on large ships shall be omitted. Arrangement of longitudinal bulkheads and other structure between shell, holding bulkhead, and second deck shall be indicated diagrammatically. Only shell plating shall show scantlings.
- Inner bottoms of cruisers, where carried up to the third deck, are not considered parts of torpedo protection systems and their scantlings shall be indicated.
- In addition to the foregoing restrictions on sections, the following shall not be shown or tabulated on the deck views or profiles:
- Arrangement of armor
 - Locations and thickness of ballistic plating on shell, decks, bulkheads, and control stations.
 - Arcs of fire of guns, torpedo tubes, and catapults.
- Angles of sight of directors, spotting glasses, range finders, and other optical instruments for fire control.
- Work shops—list of machine tools and workbenches.
- Yards and gaffs.
- Capacities of magazines and ready service stowages.
- Capacities of fuel oil, reserve feed water, and gasoline tanks (except for submarines).
- Stowages of airplanes other than catapult positions.
- All deck and profile views shall be to the same scale, which shall be as follows:
- 1/16 inch to the foot for ships of 450 feet and more overall length
 - 1/8 inch to the foot for ships of less than 450 feet overall length
- The compartment directory shall comprise a list in alphabetical order of all compartment designations, giving the number and location as shown in the example below:
- Where two or more compartment designations are alike the forward one shall be listed first and followed by those farther aft, deck by deck, starting from the highest level.
- Approval and distribution.*—A complete booklet, with exception of data not available, shall be submitted for approval at the earliest practicable date, but before the ship's 40 percent complete. Thereafter at three month intervals (provided changes have been made since last issue), the contractor shall submit for approval two reverse reading paper vandyke prints of the complete booklet. Upon completion of the ship the booklet shall be certified correct by the Supervisor and three final vandyke prints furnished him for distribution.

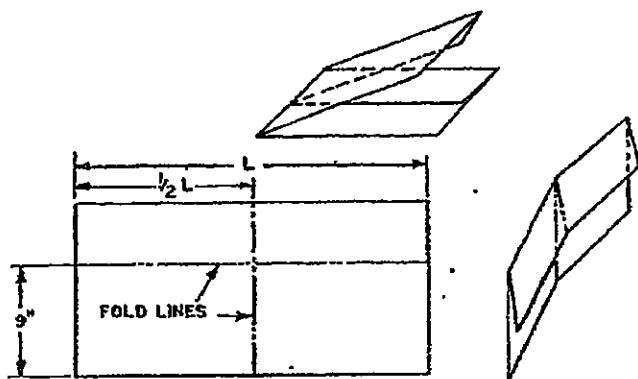
COMPARTMENT DESIGNATION	NO.*	DECK	FRAME	REMARKS
Amplidyne room	1-93-3-C	Main	93-105 1/2 std	
Aviation workshop	3-149-0-Q	3rd deck	149-155 c. 1.	
Battle dressing station	4-101-2-L	2nd platform	101-104 port	

*Surface ships only

SI-1

21

SI-1



METHOD OF FOLDING PLATE HAVING A VERTICAL
DIMENSION EXCEEDING 9"

PASTE AS SHOWN BELOW
ALONG THESE EDGES

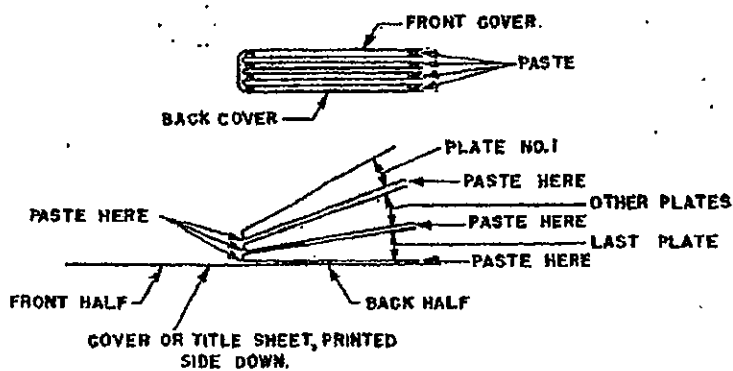
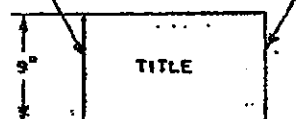


FIGURE 1.—METHOD OF ASSEMBLING BLUEPRINTS OF BOOKLETS OF GENERAL PLANS

SI-1
Amendment 1
1 April 1958

Section SI-1 (dated 1 December 1957)

Page 8, lines 34-35 delete
and substitute "Power
system design plan."

Page 13, after line 24 add
"Cable ends to be sealed
shall be indicated on".

Exhibit O

■ 9999906 2107269 T98 ■

MIL-B-15071(SHIPS)
 1 April 1950
 SUPERSEDING
 35B2(INT)
 1 July 1945

MILITARY SPECIFICATION

BOOKS, INSTRUCTION; PREPARATION, CONTENTS, AND APPROVAL

1. CLASSIFICATION

1.1 Types.- Instruction books shall be furnished in the following types as specified (see 6.1):

- Type A - (Type A instruction books may be required where the system or equipment to be described is of a highly specialized or extremely complex nature, and where the importance of the equipment justifies unusual effort in the preparation of the instruction book.) (See 3.2.)
- Type B - (Type B instruction books are required where the equipment or system to be described has no direct commercial counterpart or which is sufficiently complex that a detailed description, and maintenance instructions are required and must be supplemented by sufficient photographs, drawings, parts lists, etc.) (See 3.3.)
- Type C - (Type C instruction books are required where the equipment or system to be described is an adaptation or variation of conventional commercial equipment, where with certain modifications and additional data, the type of instructional matter normally furnished will serve the purpose.) (See 3.4.)
- Type D - (Type D instruction books are required where the equipment or system to be described is generally the same as equivalent commercial equipment, or is sufficiently simple that standard manufacturer's instruction pamphlets and service data are adequate.) (See 3.5.)

2. APPLICABLE SPECIFICATIONS, OTHER PUBLICATIONS, AND DRAWINGS

2.1 Specifications.- The following specifications, of the issue in effect on date of invitation for bids, form a part of this specification:

Military Specifications

- JAN-P-105 - Packaging and Packing for Overseas Shipment, Boxes; Wood, Cleated, Plywood.
- JAN-P-106 - Packaging and Packing for Overseas Shipment, Boxes; Wood, Nailed.
- JAN-B-107 - Boxes; Wood, Wire-Bound (Overseas Type).
- JAN-P-125 - Packaging and Packing for Overseas Shipment, Barrier-Materials, Waterproof, Flexible.
- JAN-P-140 - Packaging and Packing for Overseas Shipment, Adhesives, Water-Resistant, Case-Liner.

Navy Department Specification

General Specifications for Inspection of Material.

(Army.- Copies of specifications should be obtained from the procuring agency or as directed by that agency. Both the title and identifying number or symbol should be stipulated when requesting copies.)

GPO-O-NAV-J-78

9999906 2107270 70T

MIL-B-15071(SHIPS)

(Navy.- Copies of Military (including Joint Army-Navy and National Military Establishment specifications) and Navy Department specifications may be obtained upon application to the Bureau of Supplies and Accounts, Navy Department, Washington 25, D. C., except that activities of the Armed Forces should make application to the Commanding Officer, Naval Supply Center, Norfolk 11, Va. Both the title and identifying number or symbol should be stipulated when requesting copies.)

(Air Force.- Copies of Military specifications (including Joint Army-Navy and National Military Establishment specifications) may be obtained upon application to the Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Both the title and identifying number or symbol should be stipulated when requesting copies.)

(Marine Corps.- Copies of Military specifications (including Joint Army-Navy and National Military Establishment specifications) may be obtained upon application to the Quartermaster General, Headquarters U.S. Marine Corps, Navy Department, Washington 25, D. C. or the Depot Quartermaster, Marine Corps Depot of Supplies, 1100 South Broad Street, Philadelphia 46, Pa. Both the title and identifying number or symbol should be stipulated when requesting copies.)

2.2 Other publications.- The following publications, of the issue in effect on date of invitation for bids, form a part of this specification:

Navy Administrative Office Publication
NAVEXOS P-29 - Security Measures for the Protection of Classified Printed Matter
During Production.

(Copies of Publication NAVEXOS P-29 may be obtained upon application to the Administrative Office, Navy Department, Washington 25, D. C.)

Bureau of Supplies and Accounts Publication
Navy Shipment Marking Handbook.

(Copies of the Navy Shipment Marking Handbook should be obtained from the sources given for obtaining specifications.)

2.3 Drawings.- The following drawing, of the issue in effect on date of invitation for bids, forms a part of this specification:

Bureau of Ships Drawing
S0103-73729 - Standard Drawing Format for Production Drawings.

(Copies of Bureau of Ships drawings may be obtained only upon application to the Bureau of Ships, Navy Department, Washington 25, D. C. Both the title and identifying number or symbol should be stipulated when requesting copies.)

3. REQUIREMENTS

3.1 Material.- The minimum material requirements are as specified hereinafter. A good grade material shall be used when a definite material is not specified.

3.2 Type A instruction books.- Type A instruction books shall be as specified in the individual contract or order (see 6.1).

■ 9999906 2107271 646 ■

MIL-B-15071(SHIPS)

3.3 Type B instruction books.-

3.3.1 Contents.- Type B instruction books shall contain the following information as applicable, presented in a logical arrangement (see figs. 1 to 8, inclusive):

- (a) Title page (see fig. 2).
- (b) General data (see 3.3.1.1).
- (c) Table of contents, listing all divisions and primary and secondary subdivisions (such as chapters, sections, etc.) with their corresponding page numbers.
- (d) List of illustrations and plans, specifying titles, figure numbers and pages on which such illustrations appear.
- (e) Introduction (see 3.3.1.2).
- (f) Detailed description (see 3.3.1.3).
- (g) Installation instructions (see 3.3.1.4).
- (h) Adjustments and tests (see 3.3.1.5).
- (i) Principles of operations (see 3.3.1.6).
- (j) Operating instructions (see 3.3.1.7).
- (k) Maintenance (see 3.3.1.8).
- (l) Parts identification (see 3.3.1.9).
- (m) Drawings (see 3.3.1.10 and 3.3.2.4.5.4).
- (n) Memorandum pages (see 3.3.1.11).

NOTE: Although these requirements are directly applicable to instruction books covering specific equipment, they shall be followed as closely as possible for instruction books covering systems, such as engineering piping systems. When an instruction book covers a system or an equipment composed of several distinct units (for example, a generating set consisting of a diesel engine, a generator, a voltage regulator, and a controller), it may be desirable to arrange the book in major divisions, each covering one unit. If so, the major divisions may be arranged by sub-divisions, each corresponding to the requirements herein.

3.3.1.1 General data.- This division shall contain data such as the following:

- (a) Safety notice (where high voltages or special hazards are involved).
- (b) Component list containing:
 - Description of item.
 - Navy type designation.
 - Navy or bureau or agency stock number (if available).
 - Dimensions.
 - Weight (with or without packing).
- (c) Input power requirements and heat dissipation.
- (d) Salient design characteristics.
- (e) Electron tube complement.
- (f) Serial number (if appropriate).

3.3.1.2 Introduction.- This division shall include a general description of the equipment, i.e., explain briefly what it is, where it is used, and what it will do, also all information of a general character applicable to the complete equipment. When the text contains technical terms or terms not commonly used, definitions shall be included.

9999906 2107272 582

MIL-B-15071(SHIPS)

3.3.1.3 Detailed description.- This division shall contain a complete detailed description of component assemblies and accessories which comprise the complete equipment; for example, in the case of a ship's service turbine generator set, the turbine, the gear, the generator, the exciter, and the voltage regulator. Allowable clearances, temperatures, tolerances, etc. shall be shown in tabular form.

3.3.1.4 Installation instructions.- This division shall contain methods of installation, alignment, precautions, mounting instructions, recommendations regarding shielding, grounding, bonding, etc.

3.3.1.5 Adjustment and tests.- This division shall contain instructions for the adjustment and test of the system and its major components upon initial installation or under other conditions such as after major overhaul where complete system readjustment may be required.

3.3.1.6 Principles of operation.- This division shall contain a brief resume of the principles of operation together with such illustrations, sketches, schematic piping diagrams and schematic wiring diagrams to convey an understanding of the function and operation of the equipment. Descriptions of components and assemblies using electron tubes should provide an explanation of the electronic circuits. A preferred method of describing electronic circuits is to present the description in sections, such as amplifier features, power circuits, main audio transmission path and mechanical arrangements. Theory of operation should be included where unusual or unconventional circuits or techniques are involved.

3.3.1.7 Operating instructions.- This division shall contain simple, brief and effective instructions, including normal routines and precautions to be observed in starting, operating, and shutting-down the equipment. Where operations are to be performed in specified sequence, step-by-step procedure shall be used. Operations shall be numbered in the order in which they are to be performed. Operating data which is frequently referred to in operating the equipment shall be included in this division. Tables and charts shall be used for the presentation of these instructions where varying operating conditions are encountered.

3.3.1.8 Maintenance instructions.-

3.3.1.8.1 Preventative maintenance.- This division shall cover all maintenance procedures, inspection and routine adjustments which should be performed periodically and regularly for the purpose of preventing failure or impairment of equipment. Included in this division shall be routine maintenance check charts containing the following:

- (a) A tabulation of periodic routine mechanical and electrical tests and checks which should be accomplished regularly to insure continuity of service at peak performance.
- (b) Arrangement of the table shall be such as to indicate what is to be done, when it is to be done and how to do it.
- (c) Emphasis shall be placed upon the test facilities which may be incorporated in the various components.
- (d) Instructions shall be provided for the care, inspection and cleaning of all pertinent parts.
- (e) Instructions on lubrication shall be provided as applicable, preferably in chart form. They shall include information regarding lubrication recommended by the manufacturer, the type of lubricant to be used, together with specific time periods. Lubricants shall be described by Government specification numbers where applicable and by commercial designations.
- (f) Instructions shall be included stressing the importance of properly maintaining any safety devices, interlocks, etc., provided to prevent damage to equipment or injury to personnel.

■ 9999906 2107273 419 ■

MIL-B-15071(SHIPS)

3.3.1.8.2 Corrective maintenance.- This division shall cover all information necessary to permit a technician to locate trouble and to make repairs or adjustments to each component, assembly or sub-assembly of the equipment. Included in this division shall be the following:

- (a) Trouble shooting guides for the localization of faults giving possible sources of trouble, their systems, probable cause, and instructions for remedying the faults.
- (b) Complete instructions on signal tracing for electric and electronic circuits, use of test instruments and other common servicing techniques.
- (c) Ample illustrations, photographs, exploded views giving details of mechanical assemblies, and simplified schematic diagram of the electric circuits. Illustrations, etc., contained in other divisions may be used and referred to under this division without duplicating them.
- (d) Voltage and resistance diagrams or tables for each electronic assembly showing normal voltages (with and without audio signal) and resistances as measured at the terminals of each tube socket and at other significant points in the circuit.

3.3.1.9 Parts identification.- This division shall contain identification data covering all renewal parts (parts and/or assemblies which are wearable and/or expendable during normal repair) to facilitate ready identification of parts for replacement and ordering purposes. These data shall be presented in one of the three following alternate arrangements.

- (a) **Parts list and illustrations.**- Where the instruction book does not include reduced size drawings which are prepared in accordance with the standard drawing format shown on Drawing S0103-73729, listing all renewal parts, the parts identification shall be in the form of a parts list with illustrations, arranged as specified in 3.3.1.9.1 and 3.3.1.9.2.
- (b) **Drawings and illustrations.**- Where the instruction book includes reduced size drawings which are prepared in accordance with the standard drawing format shown on Drawing S0103-73729 (see fig. 5) listing all renewal parts, and where only mechanical parts are involved, the parts identification shall be in the form of illustrations to supplement the lists of material on the drawings. Illustrations shall be prepared for each assembly, subassembly and their component renewal parts in accordance with 3.3.1.9.2 except that the index numbers shall be identical with the part numbers assigned on the above drawings. Appropriate notes shall be added to these illustrations referring to the drawings on which the assigned numbers are listed.
- (c) **Drawings, illustrations and functional listing.**- Where the instruction book includes reduced size drawings which are prepared in accordance with the standard drawing format shown on Drawing S0103-73729, and which list all renewal parts, and where electrical or electronic parts are involved, the parts identification shall be in the form of a functional listing of electrical and electronic parts with illustrations to supplement both the functional listing and the list of materials on the drawings. The functional listing of all electrical and electronic parts shall be prepared in accordance with 3.3.1.9.1.3.2. Illustrations shall be prepared for each assembly, subassembly and the component renewal parts thereof in accordance with 3.3.1.9.2, except that the index numbers shall be identical with the part numbers assigned on the above drawings (for mechanical parts) and with the reference designation assigned on the schematic wiring diagram (for electrical or electronic parts) appropriate notes shall be added to these illustrations referring to the drawings on which the assigned numbers are listed.

9999906 2107274 355

MIL-B-15071(SHIPS)

3.3.1.9.1 Parts list.-

3.3.1.9.1.1 Contents.- The parts list shall contain the following information:

- (a) List of illustrations by figure and page number.
- (b) Introduction.
- (c) Parts tabulation.
- (d) Special tools.
- (e) Numerical index of part numbers.

3.3.1.9.1.2 Introduction.- This division shall contain sufficient instructions to explain the following:

- (a) Any symbols used therein.
- (b) The general system of group assemblies in relation to the complete article.
- (c) All cross-index systems employed.
- (d) Titles or other markings intended to segregate different models.
- (e) Other information as may be required to facilitate rapid and accurate use of the parts list.

3.3.1.9.1.3 Parts tabulation.- The parts tabulation shall contain the following information:

3.3.1.9.1.3.1 Tabulation for mechanical parts.-

- (a) Figure number. This shall denote the illustration number wherein the part has been shown.
- (b) Index number. This shall denote the index number covering the complete main or sub-assembly as listed in the catalog.
- (c) Name of part and brief description.
- (d) Number required.
- (e) Unit of issue.
- (f) Contractor's service part number.
- (g) Actual manufacturer's name.
- (h) Actual manufacturer's service part number.
- (i) Standard Navy stock number (if available).

3.3.1.9.1.3.2 Tabulation for electrical and electronic parts.-

- (a) Figure number. This shall denote the illustration number wherein the part has been shown.
- (b) Reference designation assigned in the schematic wiring diagram.
- (c) Name of part and brief description (including electrical ratings).
- (d) Function. The function shall consist of a brief statement of use, purpose or the function of the part in the component.
- (e) Joint Army-Navy Type Number (where applicable).
- (f) Actual manufacturer's name.
- (g) Actual manufacturer's service part number.
- (h) Standard Navy Stock Number (if available).

■ 9999906 2107275 291 ■

MIL-B-15071(SHIPS)

3.3.1.9.1.4 Special tools.- This division shall contain a list of all special tools supplied with the equipment showing the quantity, unit of issue (i.e., each, pair, set, etc.), description, and manufacturer's identification number.

3.3.1.9.1.5 Numerical index of part numbers.- This index shall list all items contained in the parts tabulation, arranged in a logical numerical sequence. These items shall be so arranged that column 1 of the index will give the manufacturer's part number and column 2 will give the illustration index number or numbers in which the part appears.

3.3.1.9.2 Illustrations.- A view of each assembly, sub-assembly and the component parts thereof shall be shown. Identification of illustrated parts with the listed parts shall be facilitated by the use of key or index numbers which will identify all the parts in the group assembly listing.

3.3.1.9.2.1 Illustrations of the exploded type are preferable. When the use of exploded views is not practical, simple cross-sectional views may be used. The cross-sectional drawings when used for this purpose preferably shall be approved plans or excerpts from approved plans, and shall show both the manufacturer's drawing number and the plan number of the bureau or agency concerned. In case no applicable approved plan is available, cross-sectional views from manufacturer's drawings may be used.

3.3.1.9.2.2 A figure number and proper identifying caption shall appear with each illustration. In the case of subassemblies or sub-subassemblies, the caption shall also identify and give the index number of the complete assembly as it appears in the parts tabulation.

3.3.1.9.2.3 An index number with an arrow to the item, part, or tool to which it pertains shall be used in illustrations. In cases where an assembly is exploded into its component parts, one or more of which require further explosion, the primary explosion shall be referenced by the use of numerals only. The sub-assembly shall be referenced by the basic number of the part as it appears in the primary assembly but each exploded part shall have an alphabetical designation, suffixed to the number of the primary part. The sequence of numerical and alphabetical designations shall correspond to the order of removal upon disassembly, wherever practicable.

3.3.1.9.2.4 Index numbers and arrows shall be used on each illustration to identify renewal parts only.

3.3.1.10 Drawings.- This division shall contain reproductions of approved drawings, additional block diagrams, exploded views or explanatory drawings, as necessary to supplement the descriptive matter contained in the text. Wherever feasible, such diagrams, exploded views and sketches should be inserted in the text as close as possible to that portion of the text to which they apply. Diagrams of switches and relays used in the system showing the terminal numbering shall be inserted as additional drawings. The standard color codes for resistors and capacitors shall be stated, where applicable.

3.3.1.11 Memorandum pages.- Five blank pages shall be inserted at the end of the book for memorandum purposes.

3.3.2 Format.-

3.3.2.1 Divisions (chapters, sections, etc.).- Divisions of instruction books shall be by chapters or sections, numbered or lettered consecutively. In general, chapters shall be the main divisions of larger books and sections shall be the main division of smaller books. Chapters shall be further divided into sections which shall be numbered or lettered consecutively within the chapter. Where chapters are used, the first page of each chapter shall be arranged as shown on figure 3.

9999906 2107276 128

MIL-B-15071(SHIPS)

3.3.2.2 Page identification and numbering.-

3.3.2.2.1 At the top of each left-hand page, flush with the outside margin, shall appear a briefed title of the publication. At the top of each right-hand page, flush with the outside margin, shall appear the division, chapter, section, etc., number followed by its title. In some cases, it may be necessary to brief the title.

3.3.2.2.2 With the exception of fold-over pages and as otherwise specified, pages of the instruction books shall be numbered consecutively in the bottom outside corner of each page, using Arabic numerals. The first page of chapter 1 or section 1 shall be page 1. All odd-numbered pages shall appear as right-hand pages. Fold-over pages shall be right-hand pages, and when they are used within the text they shall be assigned two page numbers, and the numbers shall be printed on the face of the sheet. Fold-over arrangements are shown on figure 5.

3.3.2.2.3 In books arranged for a system or equipment composed of several distinct units (see note under 3.3.1) the pages may be consecutively numbered within each chapter (or section), the first page of each chapter (or section) being page 1. In this case, the page number shall also include the chapter number. The chapter number shall appear first.

3.3.2.3 Layout treatment.- The layout of instruction books shall be such as to conserve space without detracting from the usability or clarity of material presented. Blank pages and spaces shall be avoided wherever possible except as specified in 3.3.1.11. Textual material shall be printed on both sides of the page. Illustrations serving no instructional function or to which no reference is made in the text shall not be used. Partial page illustrations within the text are highly desirable. Several small illustrations may be grouped to form a single page layout. Wherever possible, illustrations shall be located so that reference can be made from applicable text without turning a page. Fold-over pages, double, or triple pages will be permitted only for illustrations where this procedure is essential to insure legibility. Fold-over pages shall be used primarily in the back of the book for the purpose of reproducing the drawings. Whenever it is desirable to include fold-over pages with the text in the front of the book, such fold-over pages shall not be backed up with text or illustrations. All drawings which will be used for reference purposes while reading the text shall be provided with a blank section of the same size as a page at the left hand edge of the drawing (see fig. 5). This will permit the drawing to be withdrawn clear of the book while the text is being studied. Drawings shall be reproduced on a page the same height as other pages in the book, in order that all folds will be parallel to the bound edge of the book.

3.3.2.4 Text.-

3.3.2.4.1 Tables and charts.- The use of tables and charts is desirable. Such tables and charts shall not be elaborate or complicated, and sufficient explanation shall be given to make them easily understood.

3.3.2.4.2 Reference to figures.- Where reference is made to figures, the reference shall be to the figure number. The page number shall not be used except when the illustration is located more than three pages away from the reference. When reference is made to items shown on figures by index numbers, figure number and index number shall be indicated as follows: "Remove nut (7) and drive out bolt (8). (See fig. 26)."

3.3.2.4.3 Numbers.- Numbers from one to nine, inclusive, appearing in the text for the purpose of stating quantities shall be spelled out. All other numbers shall be shown as numerals except when they are used at the beginning of a sentence, in which case they shall be spelled out and followed by the numeral in parenthesis.

■ 9999906 2107277 064 ■

MIL-B-15071(SHIPS)

3.3.2.4.4 Reference to materials.- All materials required for maintenance referred to in the instruction book, such as lubricants, sealing materials, abrasives, etc., shall be described by specification numbers where applicable.

3.3.2.4.5 Illustrations.- Illustrations (including photographs, exploded views, drawings and sketches) shall be well planned and executed. They shall enable immediate and thorough comprehension of the subject.

3.3.2.4.5.1 Illustration identification.- Illustrations shall be identified by figure number and a title. Identifying figure numbers and titles shall be positioned immediately beneath the illustration. Whenever reduced size reproductions of drawings are used as illustrations, the drawing number shall be shown as well as the figure number.

3.3.2.4.5.2 Photographs.- Photographic illustrations shall be prepared with equipment capable of reproducing all details and shall show clearly the subject matter. Photographs shall be uniformly retouched to define shapes, accentuate details, and establish correct tone value of sufficient contrast for photolithographic reproduction.

3.3.2.4.5.3 Exploded views.- Exploded views are desirable for showing the component parts of a subject. Well retouched photographs in which sharp contrast is incorporated to insure distinct detailed separation of parts may also be used for this purpose. It is preferable that all parts be exploded on their functional axis.

3.3.2.4.5.4 Drawings.- When drawings are necessary to illustrate the description, operation, and maintenance of the equipment or system, they shall be reduced in size as necessary (see fig. 5), and reproduced in black and white. Each drawing shall be identified with the drawing number of the manufacturer and the bureau or agency concerned. Drawings shall be bound into the instruction book as shown on figure 5 (see also 3.3.2.3). Drawings shall normally be placed in the back of the manual but they may be inserted close to the references when practicable. Care shall be taken in the preparation of drawings for reproduction in the instruction book to insure that when the drawings are reduced in size they shall be clear and legible.

3.3.2.4.5.5 Sketches (see fig. 6).- (NOTE: This paragraph does not pertain to reduced-size reproduction of standard approved drawings nor to portions of these drawings which may be extracted and used as illustrations in a book.)

3.3.2.4.5.5.1 The rendering of sketches (airbrushing or line rendering) shall be done with the highest possible contrast. Adjoining areas of an illustration having similar values are to be avoided. Edges of all silhouette half-tone illustrations shall be sharply defined by retouching.

3.3.2.4.5.5.2 Exploded views and cutaway views shall be drawn in perspective to appear as realistic as possible without distortion. Isometric views may be used for small parts or units which lend themselves to this method without showing noticeable distortion.

3.3.2.4.5.5.3 Except for diagrams, schematics, orthographic projections, reproductions of approved drawings, etc., all line sketches shall be prepared with the use of shading mediums to clarify and model the form of the sketch. This rendering shall be kept as simple as possible. Fuzzy freehand lines, rendering with fine lines, and cross hatching shall be avoided. Solid black shall be used in dark areas to increase contrast and simplify the sketch. This applies to cutaway views, exploded views and cross-section views.

9999906 2107278 TTD

MIL-B-15071(SHIPS)

3.3.2.4.5.6 Color.- Color shall be used functionally where necessary to show electric circuits, the flow of materials, schematic diagrams, operational diagrams, etc. Unessential color shall not be used. Backgrounds of color tints may be used to clarify outline sketches, but color for decoration is not desired.

3.3.2.4.6 Indexing and referencing of illustrations.-

3.3.2.4.6.1 Significant features or components of illustrations shall be identified by brief applicable nomenclature with arrows. Index numbers may be used on illustrations with explanatory legend under the sketch or photo only when an extremely large amount of nomenclature is required.

3.3.2.4.6.2 In order to assure a clear definition of lines where they pass through light and dark areas, arrows (leaders) shall be drawn in black with one edge outlined in white. The arrowhead, however, shall be completely outlined in white. The thickness of arrows shall be uniform and no greater than necessary to indicate clearly the desired details.

3.3.2.4.6.3 Index references and letterings (nomenclature) shall be planned to reproduce uniformly a size not less than 10-point type. Where index numbers are used, each illustration shall be handled independently with index numbers assigned consecutively, starting with number 1, except as specified in 3.3.1.9 (b), 3.3.1.9 (c), and 3.3.1.9.2.3.

3.3.2.4.7 Printing.- Printing shall be done by either offset, lithograph or letterpress method, and shall be of equal quality to first-class commercial work. Copy may be type-set, varityped, or type-written with a standard typewriter. In general, type-set copy is preferred with varityped or type copy as second choice. The style of composition to be used, however, shall be governed by the quantity of books to be produced, the relative costs of the several methods, the availability of material prepared for earlier books, etc., The contractor shall specify the method of composition to be used when manuscripts or sample copies are submitted for approval. The bureau concerned may request data from the contractor to substantiate the method of composition chosen if deemed desirable.

3.3.2.4.7.1 Arrangement.- The text may be arranged in the form of either two vertical columns or a single wide column. The two-column arrangement shown on figures 4 and 7 is preferred; the single column arrangement is shown on figure 8. Right-hand margins shall not necessarily have lines flush at right, but care shall be taken to prepare a generally uniform margin. The size of the page shall be 8-1/2 by 11 inches. Text shall be reproduced on both sides of pages.

3.3.2.5 Paper.- The paper for photolithographic reproduction shall be preferably 25 by 38-60/500-basis litho-finish; for letterpress 25 by 38-70/500-basis dull-finish enamel stock.

3.3.2.6 Covers.- Covers for books less than 1/2 inch thick (less cover) shall be of the bellows fold type and of a black fabrikoid material. Covers for books over 1/2 inch in thickness shall be made of semiflexible board covered with a black fabrikoid material, weight 6-1/2 to 7-1/2 ounces per square yard (finished cloth). The covers shall be imprinted in gold, silver or aluminum color with the information shown on figure 1. Backbones of books over 1/2 inch in thickness shall be imprinted with the Navy identification (NAVSHIPS) number (see 3.3.2.8) and title in brief.

3.3.2.7 Binding.-

3.3.2.7.1 The binding shall be looseleaf using three 3/16-inch metal posts and screws, spaced on 4-1/4 inch centers. Covers for books 1/2 inch thick or more shall have a binding flange of corrosion-resisting metal covered with 700 quality fabrikoid. On books containing less than 50 pages (25 sheets), split-type metallic fasteners with metallic washers may be used. All metal parts shall be of corrosion-resisting material, or shall be treated to resist corrosion. Under the condition that parts list (see 3.3.1.9.1) and/or the instruction book is of such thickness that the addition of the parts list would make the final book contain over 400 pages, the parts list shall be bound in a separate volume with appropriate reference on each volume as to the content of the other volume.

9999906 2107279 937

MIL-B-15071(SHIPS)

3.3.2.7.2 Overlap.- Covers shall slightly overlap the top, bottom, and right-hand edges of the book by approximately 3/16 inch. Outside corners of covers shall be slightly rounded.

3.3.2.8 Identification.- All books shall be identified by a Navy identification number of the form "NAVSHIPS 362-1023" (see figs. 1 and 2). This number will be assigned by the bureau or agency concerned upon receipt of the copy submitted for bureau or agency approval. In urgent cases, this number may be obtained by a written request, containing complete descriptive data of the equipment. This number shall be imprinted on the upper left-hand corner of the cover and upper-right hand corner of the fly-leaf of all books prior to distribution.

3.3.3 Copyright.- Instruction books shall not be copyrighted. The bureau or agency concerned reserves the right to reproduce or have reproduced in part or in entirety all instruction books procured under this specification.

3.3.4 Security classification.- Unless otherwise specified, instruction books shall be unclassified. If restricted, confidential or secret, notification of this classification shall appear on the front and back covers and each page of the books as shown on figures 1 to 5, inclusive. Confidential and secret instruction books shall be marked with consecutive serial numbers beginning with number 1. Classified instruction books shall be prepared in accordance with the Navy Handbook Security Measures for the Protection of Classified Printed Matter During Production (NAVEXOS P-29). Particular care shall be exercised to insure the security of classified matter during the preparation. Receipt cards shall be provided in all confidential and secret books. Each card shall contain the serial number of the book in which is included.

3.3.5 Method of approval.- Prior to printing of final instruction books, a complete text including a list of all illustrations (photographs, exploded views, drawings and sketches) shall be prepared and submitted in duplicate to the bureau or agency concerned via the Government inspector for approval and assignment of Navy identification (NAVSHIPS) number (see 3.3.2.8). Every effort shall be made to submit this material in ample time to permit approval and printing prior to the delivery date of the equipment.

3.3.6 Revision to incorporate changes.- The contractor will be required to furnish new and or revised pages covering all changes until the guarantee period expires. The quantity of pages furnished shall be the same as the quantity of the applicable instruction books furnished under the contract or order. New pages shall be identified with the following legend placed beside the page number and toward the binding edge of the page; on the first line, the word "New" followed by the publication identification number, and on the second line the month and year of issue. A similar procedure shall be followed for revised pages except the word "Revised" shall be substituted for the word "New".

3.3.7 Time of delivery.- Unless otherwise specified, instruction books shall be delivered with the first unit of equipment shipped. If final instruction books are not available at the time of delivery of the equipment, two copies of an adequate preliminary instruction book (see 3.3.8) shall be furnished to the Government inspector for shipment with each unit. In all cases where preliminary books are furnished they shall be replaced with final books within 60 days.

3.3.8 Preliminary instruction books.-

3.3.8.1 General.- If it appears impossible to produce final instruction books by the time the first production equipment is ready for delivery, the contractor shall request authority of the bureau or agency concerned to furnish preliminary instruction books.

3.3.8.2 Method of approval.- The procedure described in 3.3.5 shall be followed for approval of preliminary instruction books, if the final book has not been approved.

9999906 2107280 659

MIL-B-15071(SHIPS)

3.3.8.3 Printing.- The text may be printed by any quick, economical method, such as multigraph, mimeograph or similar method.

3.3.8.4 Contents.-

3.3.8.5 Text.- Preliminary instruction books shall include the complete text as it is submitted to the bureau or agency concerned for approval of final instruction books.

3.3.8.6 Illustrations.- Preliminary instruction books shall contain a complete list of the illustrations which will appear in the final book. If the final book is to include test data, or a table of weights, for example, and if any or all of the items are not available when the preliminary book is issued, then a foreword shall list all items which have been omitted and which will appear in the final book.

3.3.8.7 Book identification.- Book identification number shall be stamped on all copies of preliminary instruction books prior to distribution (see 3.3.2.8).

3.3.8.8 Covers.- Covers for preliminary books shall be at least 20 by 26-65/500-basis gray antique finish cover stock or similar material, bellows fold, with the title and other pertinent information on the cover. This information shall be identical with that which will appear on the final book except that the word "preliminary" shall appear directly in front of the identification number (see 3.3.2.8).

3.4 Type C instruction books.-

3.4.1 Contents.- Type C instruction books shall conform to 3.3 except that 3.3.1.2, 3.3.1.6, 3.3.1.8, 3.3.1.9, 3.3.1.11 and 3.3.2.4, 5, 6 shall not apply. Additional requirements are specified in 3.4.2 and 3.4.3.

3.4.2 Maintenance.-

3.4.2.1 This division shall cover all maintenance procedures and routine adjustments which should be performed periodically, as well as instructions for disassembly and replacement of worn or damaged parts. Instructions on lubrication shall be provided as applicable, preferably in chart form, and shall include the type of lubrication recommended by the manufacturer, together with specific time periods. Lubricants shall be described by Government specification numbers, where applicable, and by commercial designations.

3.4.2.2 Special tools.- Maintenance instructions shall cover the use of special tools.

3.4.3 Parts identification.- This division shall contain identification data covering all renewal parts (parts and/or assemblies which are wearable and/or expendable during normal repair) to facilitate ready identification of parts for replacement and ordering purposes.

3.4.3.1 Parts list.- Parts shall be listed as follows:

- (a) Name of part.
- (b) Number required.
- (c) Actual manufacturer's name and service part number.
- (d) Standard Navy Stock Number if available.

■ 9999906 2107281 595 ■

MIL-B-15071(SHIPS)

3.4.3.2 Parts illustrations.- A view of each assembly or subassembly or component parts shall be shown. Identification of illustrated parts shall be facilitated by the use of numbers which will identify all the parts in the parts list. Illustrations of the exploded type are preferable. When the use of exploded views is not practical, simple cross-sectional views may be used. The cross-sectional drawings when used for this purpose preferably shall be approved drawings or excerpts from approved drawings, and shall show both the manufacturer's drawing number and the drawing number of the bureau or agency concerned. In case no applicable approved drawing is available, cross-sectional views from manufacturer's drawings may be used.

3.5 Type D instruction books.-

3.5.1 Contents.- Type D instruction books shall consist of manufacturer's standard commercial instructions and parts lists bound together.

3.5.2 Format.-

3.5.2.1 Covers.- Covers shall be of a dark color impregnated paper similar to Dupont "Fabkote" 2-25 back coated. The cover shall show name and model of the equipment, manufacturer's name and address, Navy contract or order number and Navy identification (NAVSHIPS) number. Printing shall be of a light contrasting color. Covers shall be 8-1/2 by 11 inches for all books of that size or smaller.

3.5.2.2 Binding.- The books and covers shall be bound either by stapling, stitching or by use of metal binding posts.

3.5.2.3 The requirements specified in 3.3.2.8, 3.3.3, 3.3.4, 3.3.6, and 3.3.7 shall apply.

3.5.2.4 Method of approval.- Sample books shall be submitted in duplicate to the bureau or agency concerned via the Government inspector for approval and assignment of an identification (NAVSHIPS) number (see 3.3.2.8). Every effort shall be made to submit this material in ample time to permit approval prior to delivery date of the equipment.

3.6 Workmanship.- The workmanship shall be of high quality comparable in text compilation, arrangement, and accuracy to high-grade commercial instruction books and parts catalogs. Copy which has filled letters or is blurred will not be acceptable. The workmanship shall be satisfactory to the bureau or agency concerned.

4. SAMPLING, INSPECTION AND TEST PROCEDURES

4.1 The methods of approval are specified in section 3.

5. PREPARATION FOR DELIVERY

5.1 Packaging.-

5.1.1 For domestic shipment.- Commercial packaging will be acceptable.

5.1.2 For overseas shipment.- Instruction books shall be individually packaged and sealed in waterproof envelopes or wrapped and sealed in waterproof paper, the material of which shall conform to types C-1, E-1 or better of Specification JAN-P-125. The seams and closures of envelopes and wrappers shall be sealed with adhesive conforming to Specification JAN-P-140. Care shall be exercised in the use of papers having a lamination of asphaltum to prevent a deleterious effect on the books.

9999906 2107282 421

MIL-B-15071(SHIPS)

5.2 Packing.-

5.2.1 For domestic shipment.- The subject commodity, packaged as specified in 5.1.1 shall be packed in cleated plywood boxes, nailed wood boxes, or wirebound boxes conforming to Specifications JAN-P-105, JAN-P-106 and JAN-B-107, respectively, or in suitable-style corrugated or solid fiberboard boxes conforming to the following requirements:

Maximum gross weight Pounds	Minimum average bursting strength Pounds	Maximum sum of inside dimensions Inches
40	200	60
65	275	75

Bottom flaps of fiberboard shall be sealed by means of a suitable adhesive or metal-stitched. Top flaps shall be sealed, stitched, or taped, or closed by a combination of these methods. If taped, kraft gummed tape of not less than 2-1/2-inch width, 60 pound minimum basis weight shall be used. Each shipping container shall be lined with a sealed waterproof bag made of material conforming to Specification JAN-P-125. The seams and closures shall be sealed with adhesive conforming to Specification JAN-P-140. The gross weight of boxes of wood construction shall not exceed approximately 150 pounds.

5.2.2 For overseas shipment.- The subject commodity, packaged as specified in 5.1.2, shall be packed in cleated plywood boxes or nailed wood boxes, conforming to Specifications JAN-P-105 and JAN-P-106, respectively. The gross weight shall not exceed approximately 150 pounds.

5.3 Marking.- In addition to any special marking required by the contract or order, interior packages and shipping containers shall be marked in accordance with the Navy Shipment Marking Handbook.

6. NOTES

6.1 Ordering data.- Requests, requisitions, schedules, and contracts or orders should specify the following:

- (a) Title, number and date of this specification.
- (b) Type of instruction book required (see 1.1).
- (c) Requirements for type A (see 3.2).
- (d) Details of special requirements for plans, charts, illustrations, etc., pertinent to the particular equipment, if not covered by the equipment specification.
- (e) Security classification, if required (see 3.3.4).
- (f) Whether the books are to be packed and marked for domestic or overseas shipment (see 5.2 and 5.3).
- (g) Quantity of instruction books required (see 6.2).

■ 9999906 2107283 368 ■

MIL-B-15071(SHIPS)

6.2 Instruction books for stock should be specified generally in the following quantities:

Number of equipments	Number of copies
1 to 5	25
6 to 25	25 plus 2 per equipment
26 to 950	50 plus 2 per equipment
Over 950	1000

Bulk copies of books furnished for stock should be shipped to:

Commanding Officer
Ships Parts Control Center
Naval Supply Depot
Stock Control Department
Mechanicsburg, Pennsylvania

6.3 Copies of this specification may be obtained upon application to the Bureau of Supplies and Accounts, Navy Department, Washington 25, D. C., except that activities of the Armed Forces should make application to the Commanding Officer, Naval Supply Center, Norfolk 11, Va. Both the title and identifying number or symbol should be stipulated when requesting copies.

Notice.- When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

■ 9999906 2107284 274 ■

FIGURE 1 - TYPICAL COVER

BUREAU OR AGENCY IDENTIFICATION AND NUMBER OF PUBLICATION appears in upper left-hand corner, set in 18pt. Stymie light caps with Stymie bold numerals.

SECURITY CLASSIFICATION (See 3.3.4) appears in upper right-hand corner, set in 18 pt. Stymie light caps. (Security Classification in this case is "Restricted".)

TYPE OF BOOK set in 24 pt. Stymie extra bold upper and lower case.

SPECIFIC TITLE OF BOOK set in 30 pt. Stymie extra bold caps.

MANUFACTURER'S NAME AND ADDRESS

MANUFACTURER'S CONTRACT NUMBER TO be set under Manufacturer's name as shown, in 18 pt. Stymie light, upper and lower case.

MANUFACTURER'S BOOK NUMBER OR IDENTIFICATION

NAME OF BUREAU, NAVY DEPARTMENT, WASHINGTON, D.C., to be set at bottom of page in 12 pt. Stymie light caps, letter spaced and separated as shown.

SECURITY CLASSIFICATION (See 3.3.4) appears in lower left-hand corner, set in 18 pt. Stymie light caps. (Security Classification in this case is "Restricted".)

NOTE - If Stymie is not available, the following faces may be substituted in this order: Beton, Girder, Futura and Kabel, Weights shown shall be maintained.

9999906 2107285 130
NAVSHIPS 000-0000 **RESTRICTED**

→ **INSTRUCTION BOOK**

→ **450-K W A-C/D-C**
GENERATOR SET
STEAM-TURBINE-DRIVEN

→ **MANUFACTURER'S NAME, AND**
ADDRESS

→ **Contract Nobs — 00000**

MANUFACTURER'S BOOK NUMBER

BUREAU OF SHIPS — NAVY DEPARTMENT — WASHINGTON D.C.
RESTRICTED

17

9999906 2107286 077

FIGURE 2 - TYPICAL TITLE PAGE

SECURITY CLASSIFICATION (See 3.3.4) appears in upper left-hand corner, set in 18 pt. Stymie light caps. (Security classification in this case is "Restricted".)

BUREAU OR AGENCY IDENTIFICATION AND NUMBER OF PUBLICATION appears in upper right corner, set in 18 pt. Stymie light caps with Stymie bold numerals.

TYPE OF BOOK set in 24 pt. Stymie extra bold upper and lower case.

SPECIFIC TITLE OF BOOK set in 30 pt. Stymie extra bold caps.

APPLICABLE VESSELS (when appropriate) to be set under title of book, as shown, in 18 pt. Stymie light, upper and lower case.

MANUFACTURER'S NAME AND ADDRESS

MANUFACTURER'S CONTRACT NUMBER to be set under Manufacturer's Name and address as shown in 18 pt. Stymie light, upper and lower case.

MANUFACTURER'S BOOK NUMBER OR IDENTIFICATION

DATE OF PUBLICATION to be included at the lower right of page.

SECURITY CLASSIFICATION (See 3.3.4) appears in lower right-hand corner, set in 18 pt. Stymie light caps with Stymie bold numerals.

■ 9999906 2107287 T03 ■

→ RESTRICTED
NAVSHIPS 000-0000

→ INSTRUCTION BOOK
→ 450-KW A-C/D-C
GENERATOR SET
STEAM-TURBINE-DRIVEN

→ CL-55 CLASS

→ MANUFACTURER'S NAME AND
ADDRESS

→ Contract NOBS-00000

→ MANUFACTURER'S BOOK NUMBER

BUREAU OF SHIPS—NAVY DEPARTMENT —
RESTRICTED

APRIL 1950

9999906 2107288 94T

FIGURE 3 - TYPICAL CONTENTS PAGE

CHAPTER TITLE to appear in upper right-hand corner, set in 18 pt. Futura bold caps.

CHAPTER AND NUMBER to be set in 30 pt. Stymie light, upper and lower case.

"DETAILED DESCRIPTION" to be set in 14 pt. Stymie light caps.

"LIST OF SECTIONS" and "PAGE No." to be set in 10 pt. Stymie light caps.

THE LISTING OF SECTIONS (number, name, and page) to be set in 14 pt. Futura bold, upper and lower case. All of the above materials is to be set as close as possible in style to that shown with sufficient leading and with the whole text block centered between the rules.

FOLIO NUMBER to appear on trim edge and bottom and to be set in 12 pt. Futura bold.

CLASSIFICATION to appear on binding side at the bottom and to be set in 12 pt. Futura bold caps.

NOTE.- Girder or Beton light or medium may be substituted for Stymie. Any other Sans Serif type of same weight may be substituted for Futura.

9999906 2107289 886

RESTRICTED

DETAILED DESCRIPTION

Chapter 2

DETAILED DESCRIPTION

LIST OF SECTIONS

PAGE NO.

1	Turbine	22
2	Speed Reducing Gear	23
3	Oil System	24
4	A-C Generator	26
5	D-C Generator	29
6	Voltage Regulator Equipment	32
7	Air Circuit Breaker	40

RESTRICTED

■ 9999906 2107290 578 ■

RESTRICTED

Title of Publication - Upper corner left-hand pages
14 pt. Futura medium caps.

450 - KW A-C/D-C GENERATOR SET, STEAM-TURBINE-DRIVEN

SECTION 1

18 pt. Stymie medium caps.

Description of Turbine

18 pt. Stymie medium upper
and lower case.(Give complete name plate data as part of the title of description of turbine,
reduction, etc.)

The general arrangement of the

set is shown in Fig. 4. The turbine and pinion shafts are rigidly connected and supported by three bearings, two in the reduction-gear casing and one at the exhaust end of the turbine.

Primary Subheads—14 pt. Futura extra bold caps centered. **ROTOR**

The bucket wheels, shaft, coupling flange, and balancing rings are all integral, being machined from a solid alloy steel forging. The pinion is bolted on one end of the turbine rotor and the emergency governor on the other. The rotor, complete with buckets, is balanced statically and dynamically at the factory.

Balancing Rings

The coupling flange of the rotor is tapped on its outer periphery for radial balancing plugs. See photograph below. At the exhaust end, the shaft carries another integrally forged balancing ring, tapped for axial balancing plugs.

DYNAMIC BALANCING. Adjustment of the rotor for dynamic balance is accomplished by the insertion at the proper points in these rings of balancing plugs of the correct weight. The plugs, when threaded into their holes, are drawn flush with the outer shoulder, and the outer thread of the hole is staked over. See Fig. 31, page 26, for generator balancing rings.

All of the holes are filled initially with one-half inch screw plugs to minimize windage loss, and the balancing plugs are substituted where necessary. These plugs provide an accessible means of balancing when rebucketing the rotor. During inspection periods it is advisable to inspect all plugs to see that they are tight.

Buckets

The buckets on all the wheels are of corrosion-resisting steel, and are attached by T-head dovetails. The buckets are spaced by skirts at the dovetail, machined as an integral part. The buckets are banded together in sections by steel shroud bands riveted onto the buckets.

FIGURE 4. TYPICAL TEXT PAGE

A typical text page spread is shown here with type and spacing specifications noted. New sections may be started near the bottom of the page if the space allows a minimum of three lines of type in each column; tabulated matter may be run two columns or one column.

Fig. 4.- Turbo-generator set as seen from turbine end, throttle-valve side

Classification—Inner bottom corner, 12 pt. RESTRICTED
Futura bold caps.

9999906 2107291 434

RESTRICTED

Chapter Heading—Upper right-hand corner
of right-hand pages, 14
pt. Futura medium caps. **DETAILED DESCRIPTION**
1 pt. rule 1 pica 1 pica

A shroud band of corrosion-resisting steel extends completely around the outer circumference of the buckets on each wheel. This band closes over the tops of the buckets and, by projecting slightly on each side of the buckets, aids in preventing steam leakage over the tops of the wheels.

The low-pressure end of the rotor carries an emergency governor assembly. The housing of the assembly is machined to receive a ratchet wrench for turning the rotor by hand. A wrench for this purpose is furnished with the units.

NOZZLE PLATE

The cast steel first-stage nozzle plate (3), Fig. 2, is bolted to and calked in the upper half of the high-pressure head. The nozzle plate contains a series of

reamed nozzles opening into ports on the high-pressure side.

Nozzle Diaphragms

The five nozzle diaphragms are made of steel with welded corrosion-resisting steel nozzle partitions. Secondary Subheads—14 pt. Futura extra bold upper and lower case, flush left.

Because of the high steam temperature at the inlet end of the casing, the second-stage diaphragm is supported at the center line to allow for radial expansion.

SECOND-STAGE DIAPHRAGM. The lower half of the second-stage diaphragm is further positioned by the centering dowel (7) in the bottom of the casing. Crush pins (4) around the periphery of the diaphragm assist in holding both halves securely in place.

2½ picas

SECTION 2

Description of Speed Reducing Gear

2 picas

The reducing gear is the single-reduction, single-helical type, and reduces the turbine speed of 10,059 r. p. m. to the generator speed of 1,200 r. p. m.

PINION

The pinion is forged integral with the shaft. One end of the shaft is provided with a flange that bolts rigidly to the turbine shaft and through which one end of the turbine rotor is supported. The other end of the pinion shaft has an extension, on which is assembled the thrust bearing. The complete assembly is shown in Fig. 6.

GEAR WHEEL

The gear wheel is a steel forging and is pressed and keyed on a forged steel shaft. One end of the gear shaft is solidly coupled to the generator shaft, and part of the weight of the generator rotor is carried by the gear bearing at that end. The turbine end of this shaft is extended to carry the spiral gear that drives the oil pump and the governor.

GEAR CASING

The gear casing consists of two halves which are joined at the horizontal center line of the rotors. The bearing seats for supporting the gear and pinion bearings, the oil pump seating, and the supports for the high-pressure end of the turbine are fabricated integral with the lower half of the casing.

RESTRICTED

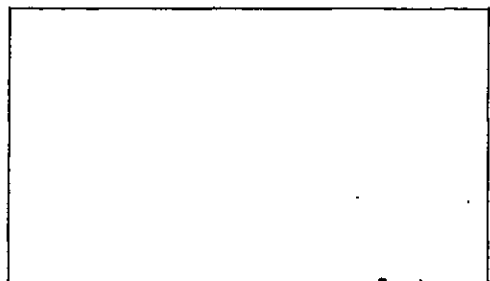


FIG. 5—View of the pinion showing half of the solid coupling, which is bolted to the turbine rotor

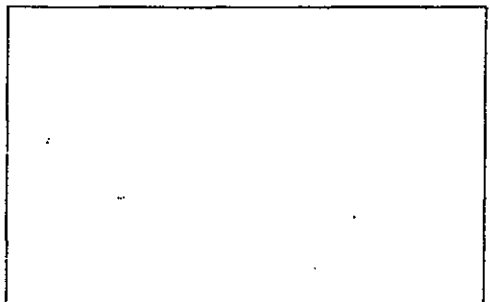


FIG. 6—Reducing gear with upper half casing removed showing the pinion and gear wheel assembled in their operating positions Captions—Italic of text.

Folio—Outer bottom corner, 12 pt.

23

■ 9999906 2107292 370 ■

RESTRICTED

MODEL GSB-8 DIESEL ENGINE

FIGURE 5. TYPICAL GATEFOLD
OR FOLD-IN PAGES

The following three pages illustrate correct style that may be followed in gatefold pages where oversize illustrations of blue-prints are to be used. Fold-over pages, double, or triple pages will be permitted only for illustrations where essential to insure legibility.

ENGINE THROTTLE CONTROL

DESCRIPTION

The engine throttle control system is made up of a series of linkages which, in direct connection with a hydraulic system, enable the operator to start and operate the engine at any required speed. (Fig. 3.) For complete understanding the following description is essential:

1. A mechanical linkage sets the limit to which fuel can be injected.
2. The engine throttle control sets the operating fuel pressure of the fuel pump.
3. A mechanical linkage from the control governor operates the control shaft which is coupled to the fuel injectors.
4. The hydraulic system, in conjunction with the linkage system, operates the control governor regulator shaft.
5. The throttle control operates the limit switch which controls the electrical circuit of the brake on the propeller shaft, just aft of the reduction gear.

The engine throttle control system is actuated by the movement of the throttle lever, or handle, of the hydraulic transmitter, which is located on the after side of the engine control box. (Fig. 1.) When the throttle lever is in the extreme out position, the hydraulic transmitter and receiver units are synchronized. (This function will be explained in detail later in this section.)

As the throttle handle is moved inward, beyond the synchronizing stage, it reaches the point where, for a few degrees of travel, it operates the air starting system (Section 20). When the air starting system is functioning, no fuel is admitted into the cylinders; however, at the instant when the throttle handle is moved farther inward and the air starting valve is released, fuel oil is

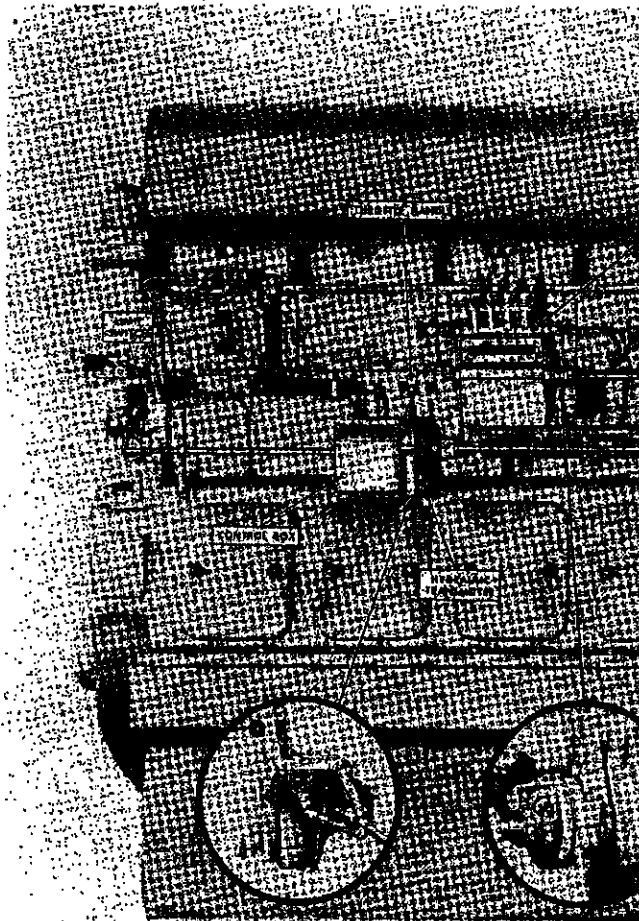
then injected into the cylinders, and the engine begins to operate under its own power. Continuing the inward movement of the throttle handle increases the amount of fuel oil which is injected into the cylinders, and thereby increases the speed and power of the engine (Section 4).

The serrated shaft of the transmitter is linked with the throttle shaft which, in turn, is directly linked with the throttle lever tube. The throttle shaft is supported in two bronze bearings which are bolted to pads on the cylinder block, just below the camshaft trough. (Fig. 3.) The throttle lever tube floats on the control shaft, and a lever attached to it is connected with the regulating adjusting lever of the fuel oil pump. A spring loaded piston and cylinder assembly is built into the regulating adjusting lever, and its function is to permit the throttle shaft to pass through the synchronizing and air starting stages without moving the fuel pump pressure regulating lever. This permits the regulating lever to be moved from its idling position to maximum engine load position. A pin lever, welded to the throttle lever tube, sets a position beyond which the control lever on the control shaft cannot advance. Therefore, the control lever cannot be advanced beyond the throttle setting, and no additional fuel oil will be injected into the cylinders until the throttle is advanced farther. The control lever rides on the pin lever of the throttle lever tube, unless the automatic function of the governor tends to hold it away from the pin lever.

The two fuel injectors are synchronized and are coupled by the intermediate control shaft. The after fuel injector is coupled to the control shaft, which is supported at the opposite end by a ball bearing in a bracket attached to the camshaft gear cover.

RESTRICTED

9999906 2107293 207



RESTRICTED

9999906 2107294 143

RESTRICTED

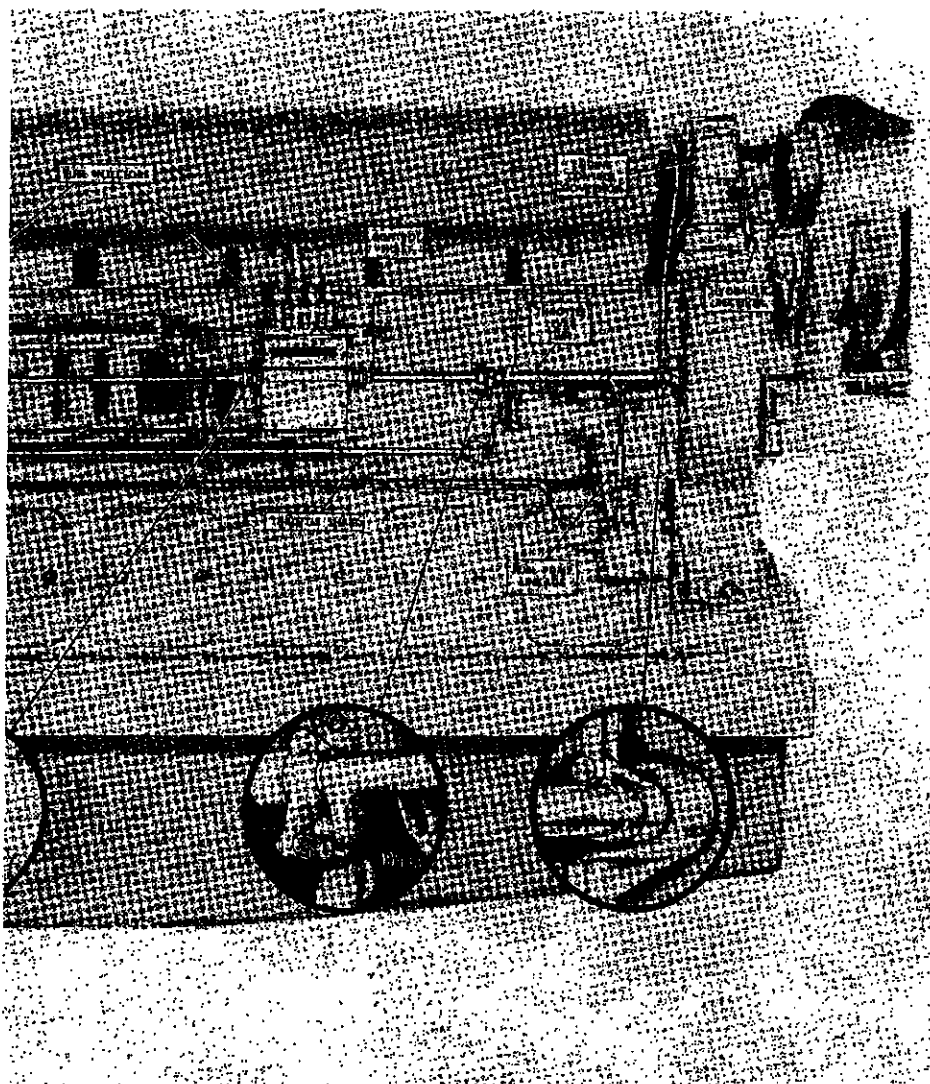
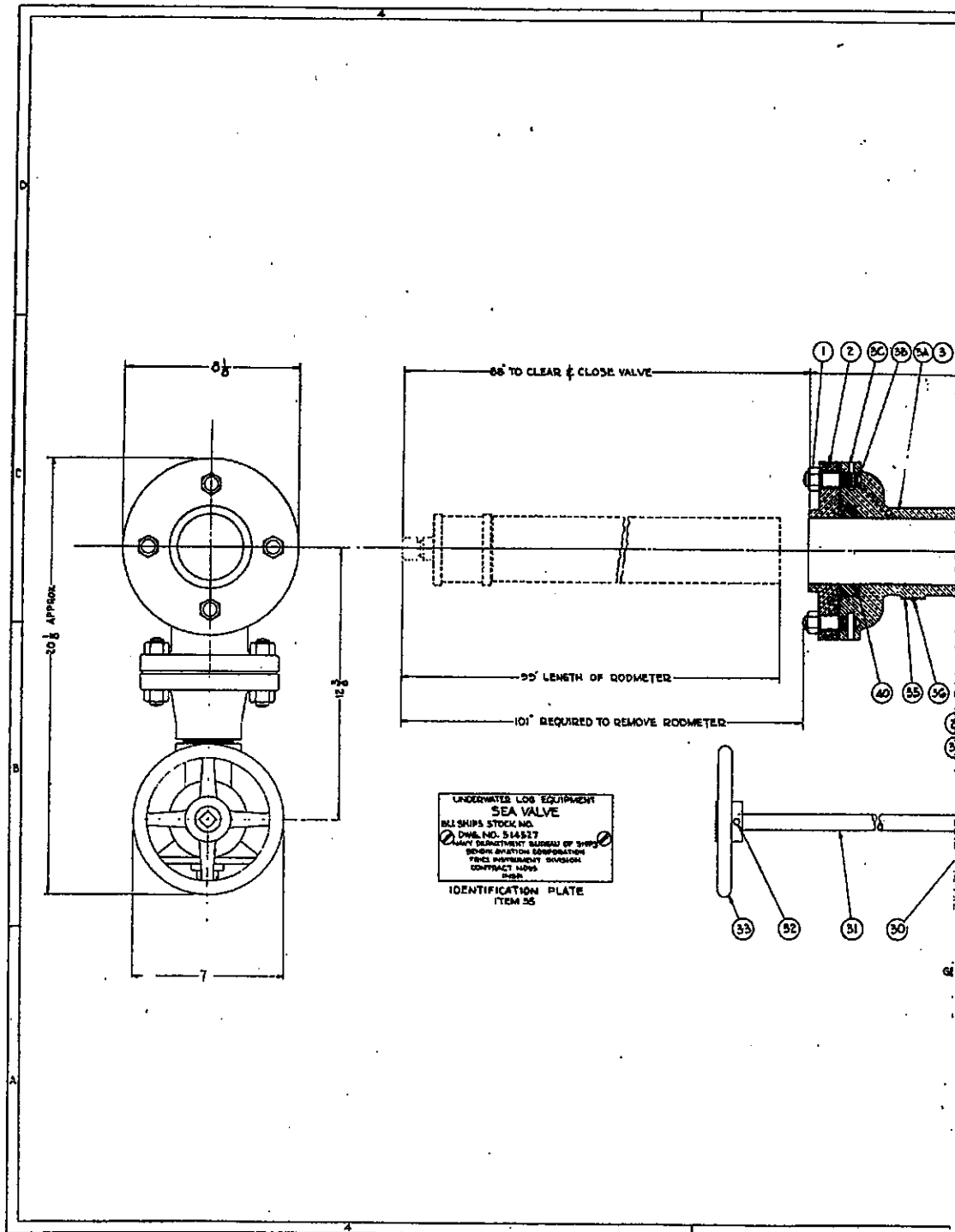


Figure 3 - Engine Control System

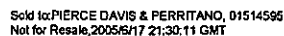
25

1344

9999906 2107295 08T



26

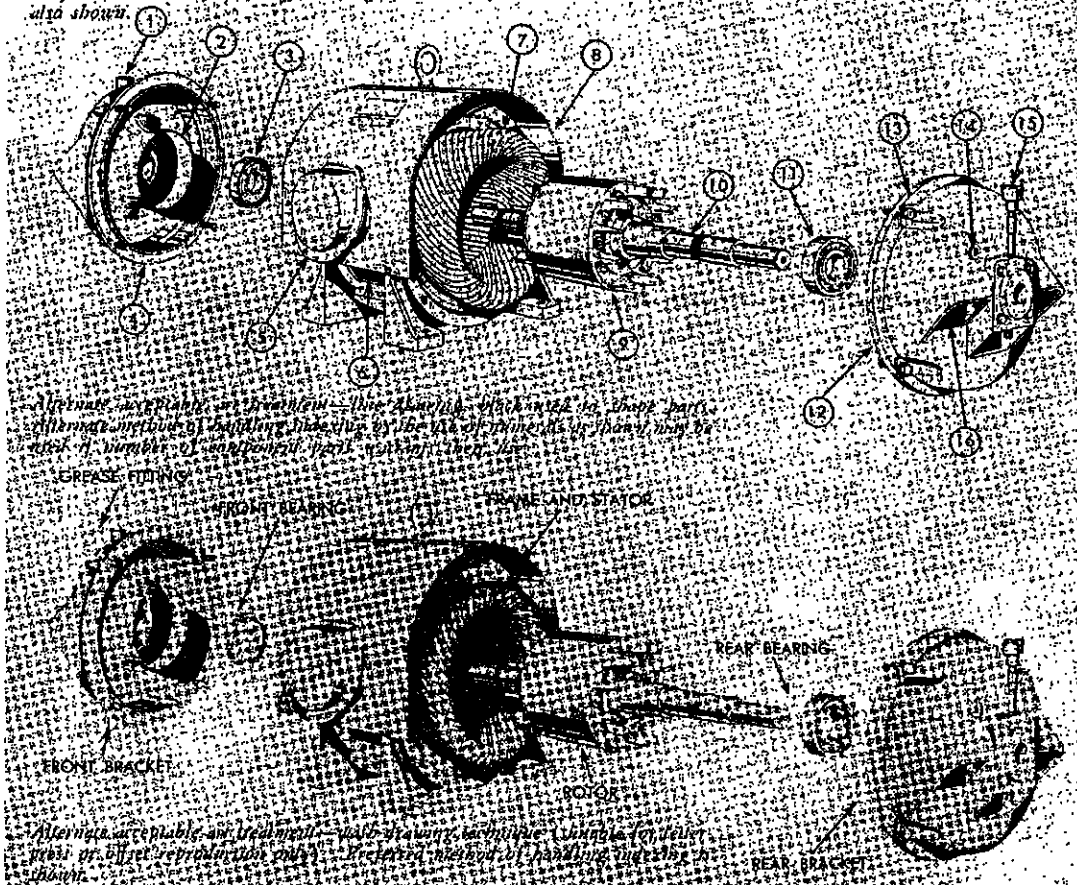
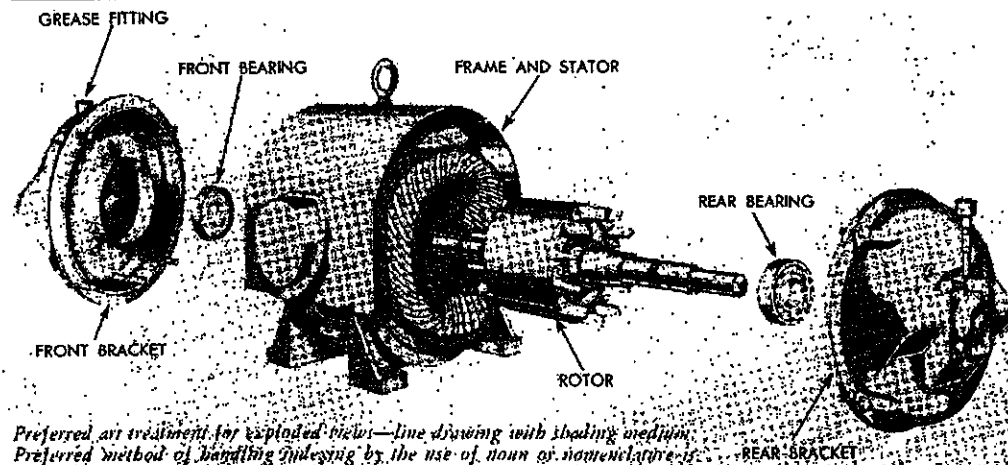


Provided by IHS *D - 4 - 1 - 7*
No reproduction or networking permitted without license from IHS

9999906 2107298 899

Fig. 6

ART TREATMENT FOR EXPLODED VIEWS



NOTE.—Where letterpress or offset reproduction is to be employed, well-retouched photographs, exploded as per drawing shown above will also be acceptable.

■ 9999906 2107299 725 ■

FIGURES 7 AND 8

These figures show approved style to be followed on manuals which are to be typewritten, varityped, or set with the electric typewriter. All copy should be prepared to allow for a 15- or 20-percent reduction in size.

9999906 2107300 277

TITLE OF BOOK

MFR'S NUMBER

Fig. 7

PART I

DESCRIPTION OF TURBINE AND GEAR

GENERAL ARRANGEMENT

The design of the turbine and arrangement of the main parts are shown in the assembly drawing, Fig. 2. The turbine, as well as the gear and generator, is mounted on a rigid steel base as indicated in the outline, Fig. 1. The exhaust end of the turbine is carried from the base on

vertical supports which are rigid in a cross-axis direction but are flexible in an axial direction thereby allowing for axial expansion of the turbine casing under load conditions. The high-pressure end of the turbine is bolted rigidly to the gear casing.

SECTION I

DESCRIPTION OF TURBINE

The throttle valve is provided with both a hand-wheel for manual control and an emergency tripping device. The throttle valve will be tripped closed automatically by an emergency governor.

Fig. 2, is bolted to and caulked in the upper half of the high pressure head. The nozzle plate contains a series of reamed nozzles opening into ports on the high-pressure side.

ROTOR AND BUCKETS

The turbine rotor (1), Fig. 2, consisting of shaft, bucket wheels, and coupling, is machined from a solid steel forging. The coupling flange of the rotor is tapped around its outer periphery for balancing plugs.

The throttle valve is provided with a handwheel for manual control and an emergency tripping device. The throttle valve will be tripped closed automatically by an emergency governor.

Buckets

The buckets of all six wheels are made of corrosion-resisting steel. They are secured to the periphery of each wheel by dovetails. The spacing of the buckets around the wheels is determined by skirts at the dovetails. The skirts form a part of the buckets.

A shroud-band of corrosion-resisting steel extends completely around the outer circumference of the buckets on each wheel. This band closes over the tops of the buckets and, by projecting slightly on each side of the buckets, aids in preventing steam leakage over the tops of the wheels.

The low-pressure end of the rotor carries an emergency governor assembly. The housing of the assembly is machined to receive a ratchet wrench for turning the rotor by hand. A wrench for this purpose is furnished with the units.

NOZZLE PLATE

The cast steel first-stage nozzle plate (3),

NOZZLE DIAPHRAGMS

Nozzle diaphragms are made of steel corrosion-resisting steel nozzle partitions. The diagram five nozzle diaphragms are made of steel with welded corrosion-resisting steel nozzle partitions.

Mounting

Because of the high steam temperature at the inlet end of the casing, the second-stage diaphragm is supported at the centerline to allow for radial expansion.

SECOND STAGE DIAPHRAGM: The lower half of the second stage diaphragm is further positioned by the centering dowel (7) in the bottom of the casing. Crush pins (4) around the periphery of the diaphragm assist in holding both halves securely in place.

LOCATION OF DIAPHRAGMS: The other four diaphragms, which are located in the exhaust casing are mounted as shown in Fig. 3b. The cast steel first-stage nozzle plate (3), Fig. 2 is bolted to and caulked in the upper half of the high pressure head.

The first stage is drained through a valve at the bottom of the casing.

TURBINE CASING

The turbine casing consists of a steel high-pressure head (4), Fig. 2, and a steel exhaust casing.

9999906 2107301 103

MFR'S NUMBER

TITLE OF BOOK

PART 1DESCRIPTION OF TURBINE AND GEAR

Fig. 8

GENERAL ARRANGEMENT

The design of the turbine and arrangement of the main parts are shown in the assembly drawing, Fig. 2. The turbine, as well as the gear and generator, is mounted on a rigid steel base as indicated in the outline, Fig. 1. The exhaust end of the turbine is carried from the base on vertical supports which are rigid in a cross-axis direction but are flexible in an axial direction thereby allowing for axial expansion of the turbine casing under load conditions. The high-pressure end of the turbine is bolted rigidly to the gear casing.

SECTION 1DESCRIPTION OF TURBINE

The throttle valve is provided with both a handwheel for manual control and an emergency tripping device. The throttle valve will be tripped closed automatically by an emergency governor.

Rotor and Buckets

The turbine rotor (1), Fig. 2, consisting of chined from a solid steel forging. The coupling outer periphery for balancing plugs.

els, and coupling, is mated
is tapped around its

The throttle valve is provided with a tripping device. The throttle governor.

THIS PAGE WAS TYPED USING STANDARD
ELITE TYPE. REDUCED 15%

el for manual control and an emergency
closed automatically by an emergency

Buckets

The buckets of all six wheels are made of corrosion-resisting steel. They are secured to the periphery of each wheel by dovetails. The spacing of the buckets around the wheels is determined by skirts at the dovetails. The skirts form a part of the buckets.

A shroud-band of corrosion-resisting steel extends completely around the outer circumference of the buckets on each wheel. This band closes over the tops of the buckets and, by projecting slightly on each side of the buckets, aids in preventing steam leakage over the tops of the wheels.

The low-pressure end of the rotor carries an emergency governor assembly. The housing of the assembly is machined to receive a ratchet wrench for turning the rotor by hand. A wrench for this purpose is furnished with the units.

Nozzle Plate

The cast steel first-stage nozzle plate (3), Fig. 2, is bolted to and caulked in the upper half of the high pressure head. The nozzle plate contains a series of reamed nozzles opening into ports on the high-pressure side.

Nozzle Diaphragms

The five nozzle diaphragms are made of steel with welded corrosion-resisting steel nozzle partitions. All of the diagrams five nozzle diaphragms are made of steel with welded corrosion-resisting steel nozzle partitions.

Mounting

Because of the high steam temperature at the inlet end of the casing, the second-stage diaphragm is supported at the centerline to allow for radial expansion.

Exhibit P

■ 9999906 2107231 TLT ■

MIL-B-15071A(SHIPS)
 20 October 1952
 SUPERSEDING
 MIL-B-15071(SHIPS)
 1 April 1950

INTERIM MILITARY SPECIFICATION
 BOOK, INSTRUCTION, PREPARATION, CONTENTS
 AND APPROVAL

1. SCOPE

1.1 Scope. - This specification covers instruction book requirements for electrical and mechanical equipment.

1.2 Classification. - Instruction books shall be of the following types as specified (see 6.1):

- Type A - (Type A instruction books may be required where the system or equipment to be described is of a highly specialized or extremely complex nature, and where the importance of the equipment justifies unusual effort in the preparation of the instruction book.) (See 3.2.)
- Type B - (Type B instruction books are required where the equipment or system to be described has no direct commercial counterpart or which is sufficiently complex that a detailed description, and maintenance instructions are required and must be supplemented by sufficient photographs, drawings, parts lists, etc.) (See 3.4.)
- Type C - (Type C instruction books are required where the equipment or system to be described is an adaptation or variation of conventional commercial equipment, where with certain modifications and additional data, the type of instructional matter normally furnished will serve the purpose.) (See 3.5.)
- Type D - (Type D instruction books are required where the equipment or system to be described is generally the same as equivalent commercial equipment, or is sufficiently simple that standard manufacturer's instruction pamphlets and service data are adequate.) (See 3.6.)

2. APPLICABLE SPECIFICATIONS, STANDARDS, DRAWINGS, AND PUBLICATIONS

2.1 The following specifications, standards, drawings, and publications, of the issue in effect on date of invitation for bids, form a part of this specification:

SPECIFICATIONS

FEDERAL

- NN-B-591 - Boxes, Fiberboard, Wood-Cleated (for Domestic Shipment).
- NN-B-601 - Boxes, Wood-Cleated-Plywood, for Domestic Shipment.
- NN-B-621 - Boxes, Wood, Nailed and Lock-Corner.
- QQ-S-781 - Strapping, Flat; Steel.
- UU-P-268 - Paper, Kraft, Wrapping.
- UU-T-111 - Tape; Paper, Gummed (Sealing and Securing).
- LLL-B-631 - Boxes, Fiber Corrugated (for Domestic Shipment).
- LLL-B-636 - Boxes, Fiber, Solid (for Domestic Shipment).

CPO--O--NAV--K--47J

H

■ 9999906 2107232 976 ■

MIL-B-15071A(SHIPS)

MILITARY

- JAN-P-105 - Packaging and Packing for Overseas Shipment - Boxes, Wood, Cleated, Plywood.
- JAN-P-106 - Packaging and Packing for Overseas Shipment - Boxes, Wood, Nailed.
- JAN-P-108 - Packaging and Packing for Overseas Shipment - Boxes, Fiberboard (V-Board and W-Board), Exterior and Interior.
- MIL-P-116 - Preservation, Methods of.
- JAN-P-120 - Packaging and Packing for Overseas Shipment - Cartons, Folding, Paperboard.
- JAN-P-133 - Packaging and Packing for Overseas Shipment - Boxes, Set-Up, Paperboard.
- JAN-P-139 - Packaging and Packing for Overseas Shipment - Plywood, Container Grade.
- MIL-A-140 - Adhesive, Water-Resistant, Waterproof Barrier-Material.
- MIL-L-10547 - Liners, Case, Waterproof.
- MIL-R-15137 - Repair Parts for Electrical and Mechanical Equipment (Naval Shipboard Use).

NAVY DEPARTMENT

General Specifications for Inspection of Material.

STANDARDS

*MILITARY

MIL-STD-129 - Marking of Shipments.

DRAWINGS

BUREAU OF SHIPS

S0103-73729 - Standard Drawing Format for Production Drawings
Prepared by Contractor or Manufacturer for
Approval by Government Agency.

PUBLICATIONS

NAVY ADMINISTRATIVE OFFICE PUBLICATION

NAVEXOS P-29 - Security Measures for the Protection of Classified
Printed Matter During Production.

(Copies of specifications, standards, and drawings required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Material. - The minimum material requirements are as specified hereinafter. A good grade material shall be used when a definite material is not specified.

3.2 Type A instruction books. - Type A instruction books shall be as specified in the individual contract or order (see 6.1).

9999906 2107233 832

MIL-B-15071A(SHIPS)

3.3 General requirements for types B, C, and D instruction books. -

3.3.1 Identification. - All books shall be identified by a Navy identification number of the form NAVSHIPS 362-1023" (see figures 1 and 2). This number will be assigned by the bureau or agency concerned upon receipt of the copy submitted for bureau or agency approval. In urgent cases, this number may be obtained by a written request, containing complete descriptive data of the equipment. This number shall be imprinted on the upper left-hand corner of the cover and upper-right hand corner of the fly-leaf of all books prior to distribution.

3.3.2 Copyright. - Instruction books shall not be copyrighted. The bureau or agency concerned reserves the right to reproduce or have reproduced in part or in entirety all instruction books procured under this specification.

3.3.3 Security classification. - Unless otherwise specified in the contract or order, instruction books shall be unclassified. If restricted, confidential or secret, notification of this classification and the words "Security Information" shall appear on the front and back covers and each page of the books as shown on figures 1 to 5, inclusive. In addition, classified books shall have the following paragraph printed on the title page as shown on figure 2:

"WARNING: This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C., Sections 793 and 794. The transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law."

Confidential and secret instruction books shall be marked with consecutive serial numbers beginning with number 1. Classified instruction books shall be prepared in accordance with the Navy Handbook Security Measures for the Protection of Classified Printed Matter During Production (NAVEXOS P-29). Particular care shall be exercised to insure the security of classified matter during the preparation. Receipt cards shall be provided in all confidential and secret books. Each card shall contain the serial number of the book in which it is included.

3.3.4 Revision to incorporate changes. - The contractor will be required to furnish new, revised, or supplementary pages until the guarantee period expires. The quantity of pages furnished and the distribution shall be the same as for the instruction books provided in the original contract or order.

3.3.4.1 New pages. - When it is found necessary to include new information to augment the instruction book data, new pages shall be issued. These pages shall be identified with the following legend placed in the bottom outside corner, beside the page number and toward the binding edge of each page; on the first line, the word "New" followed by the NAVSHIPS identification number, and on the second line the month and year of issue. New pages shall bear the same number as the instruction book page they follow with the addition of a letter; for example, original page 69, new pages 69a and 69b.

3.3.4.2 Revised pages. - If it is determined that information originally furnished in instruction books must be changed for clarification, correction, or because every equipment covered by the instruction book has been uniformly modified, revised pages shall be issued. These pages shall be identified with the following legend placed in the bottom outside corner, beside the page number and toward the binding edge of each page; on the first line, the word "Revised" followed by the NAVSHIPS identification number, and on the second line the month and year of issue. Revised pages shall bear the same number as the page they replace.

3.3.4.3 Supplementary pages. - In instances where modifications are made only to a certain number of the total number of equipments covered by the instruction book, resulting in the need for alternate instructions to cover those items modified, this information shall be issued in the form of supplementary pages. These pages shall be identified with the following legend placed in the bottom outside corner, beside the page number and toward the binding edge of each page; on the first line, the word "Supplementary" followed by the NAVSHIPS identification number on succeeding lines the hull numbers of the specific ships to which the page applies, and on the last line the month and year of issue. Supplementary pages shall bear the same number as the instruction book page they follow with the addition of a letter; for example, original page 69, supplementary pages 69a, 69b.

9999906 2107234 779

MIL-B-15071A(SHIPS)

3.3.5 Time of delivery. - Unless otherwise specified in the contract or order, two copies of the instruction books shall be delivered with the first unit and each succeeding unit of equipment shipped. If final instruction books are not available at the time of delivery of the equipment, two copies of an adequate preliminary instruction book (see 3.3.6) shall be furnished to the Government inspector for shipment with each unit.

3.3.6 Preliminary instruction books. -

3.3.6.1 Method of approval. - Prior to the printing of the final instruction books, a preliminary instruction book shall be prepared and submitted in duplicate to the bureau or agency concerned via the Government inspector for approval and assignment of a Navy NAVSHIPS identification number. Every effort shall be made to submit the preliminary book in ample time to permit approval and final printing prior to the delivery date of the equipment. Preliminary books shall be furnished in instances where final books are not available for delivery with the equipment. In all instances where preliminary books are furnished in lieu of final books, they shall be replaced with final books within 60 days (see 3.3.5 and 3.3.6.2.3).

3.3.6.2 Contents. -

3.3.6.2.1 Text. - Preliminary instruction books shall consist of a complete text of the instructions required for the type of book to be furnished.

3.3.6.2.2 Illustrations. - Preliminary instruction books shall contain a list of all illustrations (photographs, exploded views, drawings, and sketches) and sample art work (less photos and drawings but including all exploded views and sketches) which will appear in the final books. If the final book is to include test data, or a table of weights, for example, and if any or all of the items are not available when the preliminary book is issued, then a foreword shall list all items which have been omitted and which will appear in the final book.

3.3.6.2.3 Book identification. - In all instances where preliminary books are furnished in lieu of final books, the NAVSHIPS identification number shall be stamped on all copies of the preliminary books prior to distribution (see 3.3.1).

3.3.6.2.4 Covers. - Covers for preliminary books shall be at least 20 by 26-65/500-basis gray antique finish cover stock or similar material, bellows fold, with the title and other pertinent information on the cover. This information shall be identical with that which will appear on the final book except that the word "preliminary" shall appear directly in front of the identification number (see 3.3.1).

3.3.6.2.5 Printing. - The text may be printed by any quick, economical method, such as multigraph, mimeograph or similar method.

3.4 Type B instruction books. -

3.4.1 Contents. - Type B instruction books shall contain the following information as applicable, presented in a logical arrangement (see figures 1 to 9, inclusive):

- (a) Title page (see figure 2).
- (b) General data (see 3.4.1.1).
- (c) Table of contents, listing all divisions and primary and secondary subdivisions (such as chapters, sections) with the corresponding page numbers.
- (d) List of illustrations and drawings, specifying titles, figure numbers and pages on which such illustrations appear.
- (e) Introduction (see 3.4.1.2).
- (f) Detailed description (see 3.4.1.3).
- (g) Installation instructions (see 3.4.1.4).
- (h) Adjustments and tests (see 3.4.1.5).
- (i) Principles of operations (see 3.4.1.6).

■ 9999906 2107235 605 ■

MIL-B-15071A(SHIPS)

- (j) Operating instructions (see 3. 4. 1. 7).
- (k) Maintenance (see 3. 4. 1. 8).
- (l) Parts identification (see 3. 4. 1. 9).
- (m) Drawings (see 3. 4. 1. 10 and 3. 4. 2. 4. 5. 4).
- (n) Memorandum pages (see 3. 4. 1. 11).

Note. - Although these requirements are directly applicable to instruction books covering specific equipment, they shall be followed as closely as possible for instruction books covering systems, such as engineering piping systems. When an instruction book covers a system or an equipment composed of several distinct units (for example, a generating set consisting of a diesel engine, a generator, a voltage regulator, and a controller), it may be desirable to arrange the book in major divisions, each covering one unit. If so, the major divisions may be arranged by sub-divisions, each corresponding to the requirements herein.

3. 4. 1. 1 General data. - This division shall contain data such as the following:

- (a) Safety notice (where high voltages or special hazards are involved) (see figure 9).
- (b) Component list containing:
 - Description of item.
 - Navy type designation.
 - Standard Navy stock number.
 - Dimensions.
 - Weight (with or without packing).
- (c) Input power requirements and heat dissipation.
- (d) Salient design characteristics.
- (e) Electron tube complement.
- (f) Serial number (if appropriate).

3. 4. 1. 2 Introduction. - This division shall include a general description of the equipment; explain briefly what it is, where it is used, and what it will do, also all information of a general character applicable to the complete equipment. When the text contains technical terms or terms not commonly used, definitions shall be included.

3. 4. 1. 3 Detailed description. - This division shall contain a complete detailed description of component assemblies and accessories which comprise the complete equipment; for example, in the case of a ship's service turbine generator set, the turbine, the gear, the generator, the exciter, and the voltage regulator. Allowable clearances, temperatures or tolerances shall be shown in tabular form.

3. 4. 1. 4 Installation instructions. - This division shall contain methods of installation, alignment, precautions, mounting instructions, recommendations regarding shielding, grounding or bonding.

3. 4. 1. 5 Adjustment and tests. - This division shall contain instructions for the adjustment and test of the system and its major components upon initial installation or under other conditions such as after major overhaul where complete system readjustment may be required.

3. 4. 1. 6 Principles of operation. - This division shall contain a brief resume of the principles of operation together with such illustrations, sketches, schematic piping diagrams and schematic wiring diagrams to convey an understanding of the function and operation of the equipment. Descriptions of components and assemblies using electron tubes should provide an explanation of the electronic circuits. A preferred method of describing electronic circuits is to present the description in sections, such as amplifier features, power circuits, main audio transmission path and mechanical arrangements. Theory of operation should be included where unusual or unconventional circuits or techniques are involved.

■ 9999906 2107236 541 ■

MIL-B-15071A(SHIPS)

3.4.1.7 Operating instructions. - This division shall contain simple, brief and effective instructions, including normal routines and precautions to be observed in starting, operating, and shutting-down the equipment. Where operations are to be performed in specified sequence, step-by-step procedure shall be used. Operations shall be numbered in the order in which they are to be performed. Operating data which is frequently referred to in operating the equipment shall be included in this division. Tables and charts shall be used for the presentation of these instructions where varying operating conditions are encountered.

3.4.1.8 Maintenance instructions. -

3.4.1.8.1 Preventative maintenance. - This division shall cover all maintenance procedures, inspection and routine adjustments which should be performed periodically and regularly for the purpose of preventing failure or impairment of equipment. Included in this division shall be routine maintenance check charts containing the following:

- (a) A tabulation of periodic routine mechanical and electrical tests and checks which should be accomplished regularly to insure continuity of service at peak performance.
- (b) Arrangement of the table shall be such as to indicate what is to be done, when it is to be done and how to do it.
- (c) Emphasis shall be placed upon the test facilities which may be incorporated in the various components.
- (d) Instructions shall be provided for the care, inspection and cleaning of all pertinent parts.
- (e) Instructions on lubrication shall be provided as applicable, preferably in chart form. They shall include information regarding lubrication recommended by the manufacturer, the type of lubricant to be used, together with specific time periods. Lubricants shall be described by Military specification numbers where applicable and by commercial designations.
- (f) Instructions shall be included stressing the importance of properly maintaining any safety devices, interlocks, provided to prevent damage to equipment or injury to personnel.

3.4.1.8.2 Corrective maintenance. - This division shall cover all information necessary to permit a technician to locate trouble and to make repairs or adjustments to each component, assembly or subassembly of the equipment. Included in this division shall be the following:

- (a) Trouble shooting guides for the localization of faults giving possible sources of trouble, the symptoms, probable cause, and instructions for remedying the faults.
- (b) Complete instructions on signal tracing for electric and electronic circuits, use of test instruments and other common servicing techniques.
- (c) Ample illustrations, photographs, exploded views giving details of mechanical assemblies, and simplified schematic diagram of the electric circuits. Illustrations contained in other divisions may be used and referred to under this division without duplicating them.
- (d) Voltage and resistance diagrams or tables for each electronic assembly showing normal voltages (with and without audio signal) and resistances as measured at the terminals of each tube socket and at other significant points in the circuit.

■ 9999906 2107237 488 ■

MIL-B-15071A(SHIPS)

3.4.1.9 Parts identification. - This division shall contain identification data covering all repair parts (parts and assemblies which are wearable or expendable during normal repair) to facilitate ready identification of parts for replacement and ordering purposes. These data shall be presented in one of the three following alternate arrangements.

- (a) Parts list and illustrations. - Where the instruction book does not include reduced size drawings which are prepared in accordance with the standard drawing format shown on Drawing S0103-73729, listing all repair parts, the parts identification shall be in the form of a parts list with illustrations, arranged as specified in 3.4.1.9.1 and 3.4.1.9.2.
- (b) Drawings and illustrations. - Where the instruction book includes reduced size drawings which are prepared in accordance with the standard drawing format shown on Drawing S0103-73729 (see figure 5) listing all repair parts, and where only mechanical parts are involved, the parts identification shall be in the form of illustrations to supplement the lists of material on the drawings. Illustrations shall be prepared for each assembly, subassembly and their component repair parts in accordance with 3.4.1.9.2 except that the index numbers shall be identical with the piece numbers assigned on the above drawings. Appropriate notes shall be added to these illustrations referring to the drawings on which the assigned numbers are listed.
- (c) Drawings, illustrations and functional listing. - Where the instruction book includes reduced size drawings which are prepared in accordance with the standard drawing format shown on Drawing S0103-73729, and which list all repair parts, and where electrical or electronic parts are involved, the parts identification shall be in the form of a functional listing of electrical and electronic parts with illustrations to supplement both the functional listing and the list of materials on the drawings. The functional listing of all electrical and electronic parts shall be prepared in accordance with 3.4.1.9.1.3.2. Illustrations shall be prepared for each assembly, subassembly and the component repair parts thereof in accordance with 3.4.1.9.2, except that the index numbers shall be identical with the piece numbers assigned on the above drawings (for mechanical parts) and with the reference designation assigned on the schematic wiring diagram (for electrical or electronic parts) appropriate notes shall be added to these illustrations referring to the drawings on which the assigned numbers are listed.

3.4.1.9.1 Parts list. -

3.4.1.9.1.1 Contents. - The parts list shall contain the following information:

- (a) List of illustrations by figure and page number.
- (b) Introduction.
- (c) Parts tabulation.
- (d) Special tools.
- (e) Numerical index of part numbers.

3.4.1.9.1.2 Introduction. - This division shall contain sufficient instructions to explain the following:

- (a) Any symbols used therein.
- (b) The general system of group assemblies in relation to the complete article.
- (c) All cross-index systems employed.
- (d) Titles or other markings intended to segregate different models.
- (e) Other information as may be required to facilitate rapid and accurate use of the parts list.

■ 9999906 2107238 314 ■

MIL-E-15071A(SHIPS)

3.4.1.9.1.3 Parts tabulation. - The parts tabulation shall contain the following information:

3.4.1.9.1.3.1 Tabulation for mechanical parts. -

- (a) Figure number. This shall denote the illustration number wherein the part has been shown.
- (b) Index number. This shall denote the index number covering the complete main or subassembly as listed in the catalog.
- (c) Name of part and brief description.
- (d) Number required.
- (e) Unit of issue.
- (f) Contractor's service part number.
- (g) Actual manufacturer's name.
- (h) Actual manufacturer's service part number.
- (i) Standard Navy stock number assigned in accordance with Specification MIL-R-15137.

3.4.1.9.1.3.2 Tabulation for electrical and electronic parts. -

- (a) Figure number. This shall denote the illustration number wherein the part has been shown.
- (b) Reference designation assigned in the schematic wiring diagram.
- (c) Name of part and brief description (including electrical ratings).
- (d) Function. The function shall consist of a brief statement of use, purpose or the function of the part in the component.
- (e) Military Type Number (where applicable).
- (f) Actual manufacturer's name.
- (g) Actual manufacturer's service part number.
- (h) Standard Navy Stock Number assigned in accordance with Specification MIL-R-15137.

3.4.1.9.1.4 Special tools. - This division shall contain a list of all special tools supplied with the equipment showing the quantity, unit of issue (each, pair, set,), description, and manufacturer's identification number.

3.4.1.9.1.5 Numerical index of part numbers. - This index shall list all items contained in the parts tabulation, arranged in a logical numerical sequence. These items shall be so arranged that column 1 of the index will give the manufacturer's part number and column 2 will give the illustration index number or numbers in which the part appears.

3.4.1.9.2 Illustrations. - A view of each assembly, subassembly and the component parts thereof shall be shown. Identification of illustrated parts with the listed parts shall be facilitated by the use of key or index numbers which will identify all the parts in the group assembly listing.

3.4.1.9.2.1 Illustrations of the exploded type are preferable. When the use of exploded views is not practical, simple cross-sectional views may be used. The cross-sectional drawings when used for this purpose preferably shall be approved drawings or excerpts from approved drawings, and shall show both the manufacturer's drawing number and the drawing number of the bureau or agency concerned. In case no applicable approved drawing is available, cross-sectional views from manufacturer's drawings may be used.

3.4.1.9.2.2 A figure number and proper identifying caption shall appear with each illustration. In the case of subassemblies or sub-subassemblies, the caption shall also identify and give the index number of the complete assembly as it appears in the parts tabulation.

■ 9999906 2107239 250 ■

MIL-B-15071A(SHIPS)

3.4.1.9.2.3 An index number with an arrow to the item, part, or tool to which it pertains shall be used in illustrations. In cases where an assembly is exploded into its component parts, one or more of which require further explosion, the primary explosion shall be referenced by the use of numerals only. The subassembly shall be referenced by the basic number of the part as it appears in the primary assembly but each exploded part shall have an alphabetical designation, suffixed to the number of the primary part. The sequence of numerical and alphabetical designations shall correspond to the order of removal upon disassembly, wherever practicable.

3.4.1.9.2.4 Index numbers and arrows shall be used on each illustration to identify repair parts only.

3.4.1.10 Drawings. - This division shall contain reproductions of approved drawings, additional block diagrams, exploded views or explanatory drawings, as necessary to supplement the descriptive matter contained in the text. Wherever feasible, such diagrams, exploded views and sketches should be inserted in the text as close as possible to that portion of the text to which they apply. Diagrams of switches and relays used in the system showing the terminal numbering shall be inserted as additional drawings. The standard color codes for resistors and capacitors shall be stated, where applicable.

3.4.1.11 Memorandum pages. - Five blank pages shall be inserted at the end of the book for memorandum purposes.

3.4.2 Format. -

3.4.2.1 Divisions (chapters or sections). - Divisions of instruction books shall be by chapters or sections, numbered or lettered consecutively. In general, chapters shall be the main divisions of larger books and sections shall be the main division of smaller books. Chapters shall be further divided into sections which shall be numbered or lettered consecutively within the chapter. Where chapters are used, the first page of each chapter shall be arranged as shown on figure 3.

3.4.2.2 Page identification and numbering. -

3.4.2.2.1 At the top of each left-hand page, flush with the outside margin, shall appear a briefed title of the publication. At the top of each right-hand page, flush with the outside margin, shall appear the division, chapter or section number followed by its title. In some cases, it may be necessary to brief the title.

3.4.2.2.2 With the exception of fold-over pages and as otherwise specified herein, pages of the instruction books shall be numbered consecutively in the bottom outside corner of each page, using Arabic numerals. The first page of chapter 1 or section 1 shall be page 1. All odd-numbered pages shall appear as right-hand pages. Fold-over pages shall be right-hand pages, and when they are used within the text they shall be assigned two page numbers, and the numbers shall be printed on the face of the sheet. Fold-over pages shall be arranged so that page numbers are visible without unfolding. Fold-over arrangements are shown on figure 5.

3.4.2.2.3 In books arranged for a system or equipment composed of several distinct units (see note under 3.4.1) the pages may be consecutively numbered within each chapter (or section), the first page of each chapter (or section) being page 1. In this case, the page number shall also include the chapter number. The chapter number shall appear first.

3.4.2.3 Layout treatment. - The layout of instruction books shall be such as to conserve space without detracting from the usability or clarity of material presented. Blank pages and spaces shall be avoided wherever possible except as specified in 3.4.1.11. Textual material shall be printed on both sides of the page. Illustrations serving no instructional function or to which no reference is made

■ 9999906 2107240 T72 ■

MIL-B-15071A(SHIPS)

in the text shall not be used. Partial page illustrations within the text are highly desirable. Several small illustrations may be grouped to form a single page layout. Wherever possible, illustrations shall be located so that reference can be made from applicable text without turning a page. Fold-over pages, double, or triple pages will be permitted only for illustrations where this procedure is essential to insure legibility. Fold-over pages shall be used primarily in the back of the book for the purpose of reproducing the drawings. Whenever it is desirable to include fold-over pages with the text in the front of the book, such fold-over pages shall not be backed up with text or illustrations. All drawings which will be used for reference purposes while reading the text shall be provided with a blank section of the same size as a page at the left hand edge of the drawing (see figure 5). This will permit the drawing to be withdrawn clear of the book while the text is being studied. Drawings shall be reproduced on a page the same height as other pages in the book, in order that all folds will be parallel to the bound edge of the book.

3. 4. 2. 4 Text. -

3. 4. 2. 4. 1 Tables and charts. - The use of tables and charts is desirable. Such tables and charts shall not be elaborate or complicated, and sufficient explanation shall be given to make them easily understood.

3. 4. 2. 4. 2 Reference to figures. - Where reference is made to figures, the reference shall be to the figure number. The page number shall not be used except when the illustration is located more than three pages away from the reference. When reference is made to items shown on figures by index numbers, figure number and index number shall be indicated as follows: "Remove nut (7) and drive out bolt (8)." (See figure 26.)"

3. 4. 2. 4. 3 Numbers. - Numbers from one to nine, inclusive, appearing in the text for the purpose of stating quantities shall be spelled out. All other numbers shall be shown as numerals except when they are used at the beginning of a sentence, in which case they shall be spelled out and followed by the numeral in parenthesis.

3. 4. 2. 4. 4 Reference to materials. - All materials required for maintenance referred to in the instruction book, such as lubricants, sealing materials or abrasives, shall be described by Military specification numbers where applicable.

3. 4. 2. 4. 5 Illustrations. - Illustrations (including photographs, exploded views, drawings and sketches) shall be well planned and executed. They shall enable immediate and thorough comprehension of the subject.

3. 4. 2. 4. 5. 1 Illustration identification. - Illustrations shall be identified by figure number and a title. Identifying figure numbers and titles shall be positioned immediately beneath the illustration. Whenever reduced size reproductions of drawings are used as illustrations, the drawing number shall be shown as well as the figure number.

3. 4. 2. 4. 5. 2 Photographs. - Photographic illustrations shall be prepared with equipment capable of reproducing all details and shall show clearly the subject matter. Photographs shall be uniformly retouched to define shapes, accentuate details, and establish correct tone value of sufficient contrast for photolithographic reproduction.

3. 4. 2. 4. 5. 3 Exploded views. - Exploded views are desirable for showing the component parts of a subject. Well retouched photographs in which sharp contrast is incorporated to insure distinct detailed separation of parts may also be used for this purpose. It is preferable that all parts be exploded on their functional axis.

3. 4. 2. 4. 5. 4 Drawings. - When drawings are necessary to illustrate the description, operation, and maintenance of the equipment or system, they shall be reduced in size as necessary (see figure 5), and reproduced in black and white. Each drawing shall be identified with the drawing number of the manufacturer and the bureau or agency concerned. Drawings shall be bound into the instruction book as

■ 9999906 2107241 909 ■

MIL-B-15071A(SHIPS)

shown on figure 5 (see also 3.4.2.3). Drawings shall normally be placed in the back of the manual but they must be inserted close to the references when practicable. Care shall be taken in the preparation of drawings for reproduction in the instruction book to insure that when the drawings are reduced in size they shall be clear and legible.

3.4.2.4.5.5 Sketches (see figure 6). - (NOTE: This paragraph does not pertain to reduced-size reproduction of standard approved drawings nor to portions of these drawings which may be extracted and used as illustrations in a book.)

3.4.2.4.5.5.1 The rendering of sketches (airbrushing or line rendering) shall be done with the highest possible contrast. Adjoining areas of an illustration having similar values are to be avoided. Edges of all silhouette half-tone illustrations shall be sharply defined by retouching.

3.4.2.4.5.5.2 Exploded views and cutaway views shall be drawn in perspective to appear as realistic as possible without distortion. Isometric views may be used for small parts or units which lend themselves to this method without showing noticeable distortion.

3.4.2.4.5.5.3 Except for diagrams, schematics, orthographic projections, reproductions of approved drawings, all line sketches shall be prepared with the use of shading mediums to clarify and model the form of the sketch. This rendering shall be kept as simple as possible. Fuzzy freehand lines, rendering with fine lines, and cross hatching shall be avoided. Solid black shall be used in dark areas to increase contrast and simplify the sketch. This applies to cutaway views, exploded views and cross-section views.

3.4.2.4.5.6 Color. - Color shall be used functionally where necessary to show electric circuits, the flow of materials, schematic diagrams or operational diagrams. Unessential color shall not be used. Backgrounds of color tints may be used to clarify outline sketches, but color for decoration is not desired.

3.4.2.4.6 Indexing and referencing of illustrations. -

3.4.2.4.6.1 Significant features or components of illustrations shall be identified by brief applicable nomenclature with arrows. Index numbers may be used on illustrations with explanatory legend under the sketch or photo only when an extremely large amount of nomenclature is required.

3.4.2.4.6.2 In order to assure a clear definition of lines where they pass through light and dark areas, arrows (leaders) shall be drawn in black with one edge outlined in white. The arrowhead, however, shall be completely outlined in white. The thickness of arrows shall be uniform and no greater than necessary to indicate clearly the desired details.

3.4.2.4.6.3 Index references and letterings (nomenclature) shall be planned to reproduce uniformly a size not less than 10-point type. Where index numbers are used, each illustration shall be handled independently with index numbers assigned consecutively, starting with number 1, except as specified in 3.4.1.9 (b), 3.4.1.9 (c) and 3.4.1.9.2.3.

3.4.2.4.7 Printing. - Printing shall be done by either offset, lithograph or letterpress method, and shall be of equal quality to first-class commercial work. Copy may be type-set, varityped, or type-written with a standard typewriter. In general, type-set copy is preferred with varityped or type copy as second choice. The style of composition to be used, however, shall be governed by the quantity of books to be produced, the relative costs of the several methods and the availability of material prepared for earlier books. The contractor shall specify the method of composition to be used when manuscripts or sample copies are submitted for approval. The bureau or agency concerned may request data from the contractor to substantiate the method of composition chosen if deemed desirable.

■ 9999906 2107242 845 ■

MIL-B-15071A(SHIPS)

3.4.2.4.7.1 Arrangement. - The text may be arranged in the form of either two vertical columns or a single wide column. The two-column arrangement shown on figures 4 and 7 is preferred; the single column arrangement is shown on figure 8. Right-hand margins shall not necessarily have lines flush at right, but care shall be taken to prepare a generally uniform margin. The size of the page shall be 8-1/2 by 11 inches. Text shall be reproduced on both sides of pages.

3.4.2.5 Paper. - The paper for photolithographic reproduction shall be preferably 25 by 38-60/500-basis litho-finish; for letterpress 25 by 38-70/500-basis dull-finish enamel stock.

3.4.2.6 Covers. - Covers for books less than 1/2 inch thick (less cover) shall be of the bellows fold type and of a black fabrikoid material. Covers for books over 1/2 inch in thickness shall be made of semiflexible board covered with a black fabrikoid material, weight 6-1/2 to 7-1/2 ounces per square yard (finished cloth). The covers shall be imprinted in gold, silver or aluminum color with the information shown on figure 1. Backbones of books over 1/2 inch in thickness shall be imprinted with the Navy identification (NAVSHIPS) number (see 3.3.1) and title in brief. Covers shall overlap the top, bottom, and right-hand edges of the book by 3/16 inch. Outside corners of the covers shall be slightly rounded.

3.4.2.7 Binding. - The binding shall be looseleaf using three 3/16-inch metal post and screws, spaced on 4-1/4 inch centers. Covers for books 1/2 inch thick or more shall have a binding flange of corrosion-resisting metal covered with 700 quality fabrikoid. On books containing less than 50 pages (25 sheets), split-type metallic fasteners with metallic washers may be used. All metal parts shall be of corrosion-resisting material, or shall be treated to resist corrosion. Should the addition of the parts list (see 3.4.1.9.1) to the instruction book result in the final book containing over 400 pages, the parts list shall be bound in a separate volume with appropriate reference on each volume as to the content of the other volume.

3.5 Type C instruction books. -

3.5.1 Contents. - Type C instruction books shall contain the following information as applicable, presented in a logical arrangement (see figures 1 to 9, inclusive):

- (a) Title page (see figure 2).
- (b) General data (see 3.5.1.1).
- (c) Table of contents, listing all divisions and primary and secondary subdivisions (such as chapters or sections) with the corresponding page numbers.
- (d) List of illustrations and drawings, specifying titles, figure numbers and pages on which such illustrations appear.
- (e) Detailed description (see 3.5.1.2).
- (f) Installation instructions (see 3.5.1.3).
- (g) Adjustments and tests (see 3.5.1.4).
- (h) Operating instructions (see 3.5.1.5).
- (i) Maintenance (see 3.5.1.6).
- (j) Parts identification (see 3.5.1.7).
- (k) Drawings (see 3.5.1.8).

Note. - Although these requirements are directly applicable to instruction books covering specific equipment, they shall be followed as closely as possible for instruction books covering systems, such as engineering piping systems. When an instruction book covers a system or an equipment composed of several distinct units (for example, a generating set consisting of a diesel engine, a generator, a voltage regulator, and a controller), it may be desirable to arrange the book in major divisions, each covering one unit. If so, the major divisions may be arranged by subdivisions, each corresponding to the requirements herein.

■ 9999906 2107243 781 ■

MIL-B-15071A(SHIPS)

3.5.1.1 General data. - This division shall contain data such as the following:

- (a) Safety notice (where high voltages or special hazards are involved). (See figure 9.)
- (b) Component list containing:
 - Description of item.
 - Navy type designation.
 - Standard Navy stock number.
 - Dimensions.
 - Weight (with or without packing).
- (c) Input power requirements and heat dissipation.
- (d) Salient design characteristics.
- (e) Electron tube complement.
- (f) Serial number (if appropriate).

3.5.1.2 Detailed description. - This division shall contain a complete detailed description of component assemblies and accessories which comprise the complete equipment; for example, in the case of a ship's service turbine generator set, the turbine, the gear, the generator, the exciter, and the voltage regulator. Allowable clearances, temperatures or tolerances, shall be shown in tabular form.

3.5.1.3 Installation instructions. - This division shall contain methods of installation, alignment, precautions, mounting instructions, recommendations regarding shielding, grounding or bonding.

3.5.1.4 Adjustment and tests. - This division shall contain instructions for the adjustment and test of the system and its major components upon initial installation or under other conditions such as after major overhaul where complete system readjustment may be required.

3.5.1.5 Operating instructions. - This division shall contain simple, brief and effective instructions, including normal routines and precautions to be observed in starting, operating, and shutting-down the equipment. Where operations are to be performed in specified sequence, step-by-step procedure shall be used. Operations shall be numbered in the order in which they are to be performed. Operating data which is frequently referred to in operating the equipment shall be included in this division. Tables and charts shall be used for the presentation of these instructions where varying operating conditions are encountered.

3.5.1.6 Maintenance. - This division shall cover all maintenance procedures and routine adjustments which should be performed periodically, as well as instructions for disassembly and replacement of worn or damaged parts. Instructions on lubrication shall be provided as applicable, preferably in chart form, and shall include the type of lubrication recommended by the manufacturer, together with specific time periods. Lubricants shall be described by Military specification numbers, where applicable and by commercial designations. Maintenance instructions shall cover the use of special tools.

3.5.1.7 Parts identification. - This division shall contain identification data covering all repair parts (parts and assemblies which are wearable or expendable during normal repair) to facilitate ready identification of parts for replacement and ordering purposes.

3.5.1.7.1 Parts list. - Parts shall be listed as follows:

- (a) Name of part.
- (b) Number required.
- (c) Actual manufacturer's name and service part number.
- (d) Standard Navy Stock Number assigned in accordance with Specification MIL-R-15137.

■ 9999906 2107244 618 ■

MIL-B-15071A(SHIPS)

3.5.1.7.2 Parts illustrations. - A view of each assembly or subassembly or component parts shall be shown. Identification of illustrated parts shall be facilitated by the use of numbers which will identify all the parts in the parts list. Illustrations of the exploded type are preferable. When the use of exploded views is not practical, simple cross-sectional views may be used. The cross-sectional drawings when used for this purpose preferably shall be approved drawings or excerpts from approved drawings, and shall show both the manufacturer's drawing number and the drawing number of the bureau or agency concerned. In case no applicable approved drawing is available, cross-sectional views from manufacturer's drawings may be used.

3.5.1.8 Drawings. - This division shall contain reproductions of approved drawings, additional block diagrams, exploded views or explanatory drawings, as necessary to supplement the descriptive matter contained in the text. Wherever feasible, such diagrams, exploded views and sketches should be inserted in the text as close as possible to that portion of the text to which they apply. Diagrams of switches and relays used in the system showing the terminal numbering shall be inserted as additional drawings. The standard color codes for resistors and capacitors shall be stated, where applicable.

3.5.2 Format. -

3.5.2.1 Divisions (chapters or sections). - Divisions of instruction books shall be by chapters or sections, numbered or lettered consecutively. In general, chapters shall be the main divisions of larger books and sections shall be the main division of smaller books. Chapters shall be further divided into sections which shall be numbered or lettered consecutively within the chapter. Where chapters are used, the first page of each chapter shall be arranged as shown on figure 3.

3.5.2.2 Page identification and numbering. -

3.5.2.2.1 At the top of each left-hand page, flush with the outside margin, shall appear a briefed title of the publication. At the top of each right-hand page, flush with the outside margin, shall appear the division, chapter or section, number followed by its title. In some cases, it may be necessary to brief the title.

3.5.2.2.2 With the exception of fold-over pages and as otherwise specified herein, pages of the instruction books shall be numbered consecutively in the bottom outside corner of each page, using Arabic numerals. The first page of chapter 1 or section 1 shall be page 1. All odd-numbered pages shall appear as right-hand pages. Fold-over pages shall be right-hand pages, and when they are used within the text they shall be assigned two page numbers, and the numbers shall be printed on the face of the sheet. Fold-over pages shall be arranged so that the page numbers are visible without unfolding. Fold-over arrangements are shown on figure 5.

3.5.2.2.3 In books arranged for a system or equipment composed of several distinct units (see note under 3.5.1) the pages may be consecutively numbered within each chapter (or section), the first page of each chapter (or section) being page 1. In this case, the page number shall also include the chapter number. The chapter number shall appear first.

3.5.2.3 Layout treatment. - The layout of instruction books shall be such as to conserve space without detracting from the usability or clarity of material presented. Blank pages and spaces shall be avoided wherever possible. Textual material shall be printed on both sides of the page. Illustrations serving no instructional function or to which no reference is made in the text shall not be used. Partial page illustrations within the text are highly desirable. Several small illustrations may be grouped to form a single page layout. Wherever possible, illustrations shall be located so that reference can be made from applicable text without turning a page. Fold-over pages, double, or triple pages will be permitted only for illustrations where this procedure is essential to insure legibility. Fold-over pages shall be used primarily in the back of the book for the purpose of reproducing the drawings. Whenever it is desirable to include fold-over pages with the text in the front of the book, such fold-over pages shall not be backed up with text or illustrations. All drawings which will be used for reference purposes

9999906 2107245 554

MIL-B-15071A(SHIPS)

while reading the text shall be provided with a blank section of the same size as a page at the left hand side of the drawing (see figure 5). This will permit the drawing to be withdrawn clear of the book while the text is being studied. Drawings shall be reproduced on a page the same height as other pages in the book, in order that all folds will be parallel to the bound edge of the book.

3.5.2.4 Text. -

3.5.2.4.1 Tables and charts. - The use of tables and charts is desirable. Such tables and charts shall not be elaborate or complicated, and sufficient explanation shall be given to make them easily understood.

3.5.2.4.2 Reference to figures. - Where reference is made to figures, the reference shall be to the figure number. The page number shall not be used except when the illustration is located more than three pages away from the reference. When reference is made to items shown on figures by index numbers, figure number and index number shall be indicated as follows: "Remove nut (7) and drive out bolt (8). (See figure 28.)"

3.5.2.4.3 Numbers. - Numbers from one to nine, inclusive, appearing in the text for the purpose of stating quantities shall be spelled out. All other numbers shall be shown as numerals except when they are used at the beginning of a sentence, in which case they shall be spelled out and followed by the numeral in parenthesis.

3.5.2.4.4 Reference to materials. - All materials required for maintenance referred to in the instruction book, such as lubricants, sealing materials or abrasives, shall be described by Military specification numbers where applicable.

3.5.2.4.5 Illustrations. - Illustrations (including photographs, exploded views, drawings and sketches) shall be well planned and executed. They shall enable immediate and thorough comprehension of the subject.

3.5.2.4.5.1 Illustration identification. - Illustrations shall be identified by figure number and a title. Identifying figure numbers and titles shall be positioned immediately beneath the illustration. Whenever reduced size reproductions of drawings are used as illustrations, the drawing number shall be shown as well as the figure number.

3.5.2.4.5.2 Photographs. - Photographic illustrations shall be prepared with equipment capable of reproducing all details and shall show clearly the subject matter. Photographs shall be uniformly retouched to define shapes, accentuate details, and establish correct tone value of sufficient contrast for photolithographic reproduction.

3.5.2.4.5.3 Exploded views. - Exploded views are desirable for showing the component parts of a subject. Well retouched photographs in which sharp contrast is incorporated to insure distinct detailed separation of parts may also be used for this purpose. It is preferable that all parts be exploded on their functional axis.

3.5.2.4.5.4 Drawings. - When drawings are necessary to illustrate the description, operation, and maintenance of the equipment or system, they shall be reduced in size as necessary (see figure 5), and reproduced in black and white. Each drawing shall be identified with the drawing number of the manufacturer and the bureau or agency concerned. Drawings shall be bound into the instruction book as shown on figure 5 (see also 3.5.2.3). Drawings shall normally be placed in the back of the manual but they may be inserted close to the references when practicable. Care shall be taken in the preparation of drawings for reproduction in the instruction book to insure that when the drawings are reduced in size they shall be clear and legible.

3.5.2.4.5.5 Sketches (see figure 6). - (NOTE: This paragraph does not pertain to reduced-size reproduction of standard approved drawings nor to portions of these drawings which may be extracted and used as illustrations in a book.)

■ 9999906 2107246 490 ■

MIL-B-15071A(SHIPS)

3.5.2.4.5.1 The rendering of sketches (airbrushing or line rendering) shall be done with the highest possible contrast. Adjoining areas of an illustration having similar values are to be avoided. Edges of all silhouette half-tone illustrations shall be sharply defined by retouching.

3.5.2.4.5.2 Exploded views and cutaway views shall be drawn in perspective to appear as realistic as possible without distortion. Isometric views may be used for small parts or units which lend themselves to this method without showing noticeable distortion.

3.5.2.4.5.3 Except for diagrams, schematics, orthographic projections, reproductions of approved drawings, all line sketches shall be prepared with the use of shading mediums to clarify and model the form of the sketch. This rendering shall be kept as simple as possible. Fuzzy freehand lines, rendering with fine lines, and cross hatching shall be avoided. Solid black shall be used in dark areas to increase contrast and simplify the sketch. This applies to cutaway views, exploded views and cross-section views.

3.5.2.4.6 Indexing and referencing of illustrations. -

3.5.2.4.6.1 Significant features or components of illustrations shall be identified by brief applicable nomenclature with arrows. Index numbers may be used on illustrations with explanatory legend under the sketch or photo only when an extremely large amount of nomenclature is required.

3.5.2.4.6.2 In order to assure a clear definition of lines where they pass through light and dark areas, arrows (leaders) shall be drawn in black with one edge outlined in white. The arrowhead, however, shall be completely outlined in white. The thickness of arrows shall be uniform and no greater than necessary to indicate clearly the desired details.

3.5.2.4.6.3 Index references and letterings (nomenclature) shall be planned to reproduce uniformly a size not less than 10-point type. Where index numbers are used, each illustration shall be handled independently with index numbers assigned consecutively, starting with number 1.

3.5.2.4.7 Printing. - Printing shall be done by either offset, lithograph or letterpress method, and shall be of equal quality to first-class commercial work. Copy may be type-set, varityped, or type-written with a standard typewriter. In general, type-set copy is preferred with varityped or type copy as second choice. The style of composition to be used, however, shall be governed by the quantity of books to be produced, the relative costs of the several methods, the availability of material prepared for earlier books. The contractor shall specify the method of composition to be used when manuscripts or sample copies are submitted for approval. The bureau or agency concerned may request data from the contractor to substantiate the method of composition chosen if deemed desirable.

3.5.2.4.7.1 Arrangement. - The text may be arranged in the form of either two vertical columns or a single wide column. The two-column arrangement shown on figures 4 and 7 is preferred; the single column arrangement is shown on figure 8. Right-hand margins shall not necessarily have lines flush at right, but care shall be taken to prepare a generally uniform margin. The size of the page shall be 8-1/2 by 11 inches. Text shall be reproduced on both sides of pages.

3.5.2.5 Paper. - The paper for photolithographic reproduction shall be preferably 25 by 38-60/500-basis litho-finish; for letterpress 25 by 38-70/500-basis dull-finish enamel stock.

3.5.2.6 Covers. - Covers for books less than 1/2 inch thick (less cover) shall be of the bellows fold type and of a black fabrikoid material. Covers for books over 1/2 inch in thickness shall be made of semiflexible board covered with a black fabrikoid material, weight 6-1/2 to 7-1/2 ounces per square yard (finished cloth). The covers shall be imprinted in gold, silver or aluminum color with the information shown on figure 1. Backbones of books over 1/2 inch in thickness shall be imprinted with the Navy identification (NAVSHIPS) number (see 3.3.1) and title in brief. Covers shall overlap the top, bottom, and right-hand edges of the book by 3/16 inch. Outside corners of covers shall be slightly rounded.

■ 4444406 2107247 327 ■

MIL-B-15071A(SHIPS)

3.5.2.7 Binding. - The binding shall be looseleaf using three 3/16-inch metal posts and screws, spaced on 4-1/4 inch centers. Covers for books 1/2 inch thick or more shall have a binding flange of corrosion-resisting metal covered with 700 quality fabrikoid. On books containing less than 50 pages (25 sheets), split-type metallic fasteners with metallic washers may be used. All metal parts shall be of corrosion-resisting material, or shall be treated to resist corrosion. Should the addition of the parts list (see 3.5.1.7.1) to the instruction book result in the final book containing over 400 pages, the parts list shall be bound in a separate volume with appropriate reference on each volume as to the content of the other volume.

3.6 Type D instruction books. -

3.6.1 Contents. - Type D instruction books shall consist of manufacturer's standard commercial instructions and parts lists bound together.

3.6.2 Format. -

3.6.2.1 Covers. - Covers shall be of a dark color fabrikoid material. The cover shall show name and model of the equipment, manufacturer's name and address, Navy contract or order number and Navy NAVSHIPS identification number. Printing shall be of a light contrasting color. Covers shall be 8-1/2 by 11 inches for all books of that size or smaller (see figure 1).

3.6.2.2 Binding. - The books and covers shall be bound either by stapling, stitching or by use of metal binding posts.

3.7 Workmanship. - The workmanship shall be of high quality comparable in text compilation, arrangement, and accuracy to high-grade commercial instruction books and parts catalogs. Copy which has filled letters or is blurred will not be acceptable. The workmanship shall be satisfactory to the bureau or agency concerned.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Inspection procedures. - For Naval purchases, the general inspection procedures shall be in accordance with General Specifications for Inspection of Material.

4.2 The methods of approval are specified in section 3.

5. PREPARATION FOR DELIVERY

5.1 Packaging for domestic and overseas shipment. -

5.1.1 Equipment instruction books shall be individually packaged in accordance with method IC-3 of Specification MIL-P-116.

5.1.2 Bulk instruction books shall be individually packaged with kraft paper having a 60-pound basis weight conforming to Specification UU-P-268 and sealed with gummed paper tape conforming to Specification UU-T-111 or shall be individually packaged in a folding carton or set-up box conforming to Specification JAN-P-120 or JAN-P-133.

5.2 Packing. -

5.2.1 Equipment instruction books for domestic and overseas shipment. - Two copies of the instruction book shall be packed within the shipping container holding the main unit of equipment.

■ 9999906 2107248 263 ■

MIL-B-15071A(SHIPS)

5.2.2 Bulk instruction books. -

5.2.2.1 For domestic shipment. - Instruction books packaged as specified in 5.1.2, shall be packed in wood cleated fiberboard, cleated plywood, nailed wood, corrugated or solid fiberboard boxes conforming to Specification NN-B-591, NN-B-601, NN-B-621, LLL-B-631, or LLL-B-636, respectively. Fiberboard boxes shall conform to the special requirements of the applicable box specification. Closure of the fiberboard boxes shall be made with adhesive metal fastenings or tape or a combination of these methods in such a manner that the closures of the boxes shall not break or open when the box is tested in accordance with the applicable box specification. The gross weight of wood boxes shall not exceed 200 pounds; of fiberboard boxes, they shall not exceed the weight limitations of the applicable box specification.

5.2.2.2 For overseas shipment. - Instruction books, packaged as specified in 5.1.2, shall be packed in cleated plywood, nailed wood, corrugated or solid fiberboard boxes conforming to style A or B of Specification JAN-P-105, style 2, 2-1/2, 3 or 4 of Specification JAN-P-106 or symbol V3c or V3s of Specification JAN-P-108, respectively. Plywood shall conform to type A or B, condition I of Specification JAN-P-139. Boxes shall be lined with a sealed waterproof case liner conforming to Specification MIL-L-10547. Liners shall be sealed with an adhesive conforming to Specification MIL-A-140. Seams and closure shall have strength and water-resistance equal to that of the body material and shall have a continuous seam of at least 3/4 inch wide. Shipping containers shall be closed and strapped in accordance with the appendix of the applicable container specification. Flat steel strapping shall conform to class A or B, of Specification QQ-S-781. The gross weight of wood boxes shall not exceed 150-pounds; of fiberboard boxes, 70-pounds.

5.3 Marking. -

5.3.1 Interior containers. - In addition to the requirements specified in Standard MIL-STD-129, each package and interior container shall be clearly and legibly marked as follows:

- (a) NAVSHIPS identification number.
- (b) Nomenclature.
- (c) Quantity.
- (d) Contract or order number.
- (e) Name of contractor or manufacturer.
- (f) Date packed and method of preservation (as applicable).

5.3.1.1 Date marking shall be eliminated where instruction books are classified in accordance with Security Regulations.

5.3.2 Exterior containers. - In addition to the marking specified in 5.3.1 and any special marking required by the contract or order, shipments shall be marked in accordance with Standard MIL-STD-129.

6. NOTES

6.1 Ordering data. - Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type required (see 1.2).
- (c) Requirements for type A (see 3.2).
- (d) Details of special requirements for drawings, charts and illustrations, pertinent to the particular equipment, if not covered by the equipment specification.
- (e) Security classification, if required (see 3.3.3).
- (f) Whether the books are to be packed and marked for domestic or overseas shipment (see 5.2 and 5.3).
- (g) Quantity of instruction books required (see 6.2).

■ 9999906 2107249 1TT ■

MIL-B-15071A(SHIPS)

6.2 Instruction books for stock should be specified generally in the following quantities:

Number of equipments	Number of copies
1 to 5	25 plus 2 per equipment
6 to 25	25 plus 2 per equipment
26 to 950	50 plus 2 per equipment
Over 950	1000 plus 2 per equipment

Bulk copies of books furnished for stock should be shipped to:

Commanding Officer
Ships Parts Control Center
Naval Supply Depot
Stock Control Department
Mechanicsburg, Pennsylvania

Notice. - When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

■ 9999906 2107250 911 ■

FIGURE 1 - TYPICAL COVER.

BUREAU OR AGENCY IDENTIFICATION AND NUMBER OF PUBLICATION appears in upper left-hand corner, set in 18 pt. Stymie light caps with Stymie bolt numerals.

SECURITY CLASSIFICATION (See 3.3.3) appears in upper left-hand corner, with "Security Information" directly below, set in 18 pt. Stymie light caps. (Security Classification in this case is "Restricted".)

TYPE OF BOOK set in 24 pt. Stymie extra bold upper and lower case.

SPECIFIC TITLE OF BOOK set in 30 pt. Stymie extra bold caps.

MANUFACTURER'S NAME AND ADDRESS

MANUFACTURER'S CONTRACT NUMBER TO be set under Manufacturer's name as shown, in 18 pt. Stymie light, upper and lower case.

MANUFACTURER'S BOOK NUMBER OR IDENTIFICATION

NAME OF BUREAU, NAVY DEPARTMENT, WASHINGTON, D.C., to be set at bottom page in 12 pt. Stymie light caps, letter spaced and separated as shown.

SECURITY CLASSIFICATION (See 3.3.3) appears in lower right-hand corner, set in 18 pt. Stymie light caps. (Security Classification in this case is "Restricted".)

NOTE - If Stymie is not available, the following faces may be substituted in this order: Beton, Girder, Futura and Kabel, Weights shown shall be maintained.

■ 9999906 2107251 858 ■

NAVSHIPS 000-0000

RESTRICTED

SECURITY INFORMATION

INSTRUCTION BOOK

450-KW A-C/D-C

GENERATOR SET

STEAM-TURBINE-DRIVEN

MANUFACTURER'S NAME, AND
ADDRESS

Contract Nobs-00000

MANUFACTURER'S BOOK NUMBER

BUREAU OF SHIPS - NAVY DEPARTMENT - WASHINGTON D.C.

RESTRICTED

■ 9999906 2107252 794 ■

FIGURE 2 - TYPICAL TITLE PAGE.

SECURITY CLASSIFICATION (See 3.3.3) appears in upper right-hand corner with "Security Information" directly below, set in 18 pt. Stymie light caps. (Security classification in this case is "Restricted".)

BUREAU OR AGENCY IDENTIFICATION AND NUMBER OF PUBLICATION appears in upper right corner, set in 18 pt. Stymie light caps with Stymie bold numerals.

TYPE OF BOOK set in 24 pt. Stymie extra bold upper and lower case.

SPECIFIC TITLE OF BOOK set in 30 pt. Stymie extra bold caps.

APPLICABLE VESSELS (when appropriate) to be set under title of book, as shown, in 18 pt. Stymie light, upper and lower case. "WARNING" paragraph shall be set 8 pt. Stymie bold, upper and lower case (see 3.3.3).

MANUFACTURER'S NAME AND ADDRESS

MANUFACTURER'S CONTRACT NUMBER to be set under Manufacturer's Name and address as shown in 18 pt. Stymie light, upper and lower case.

MANUFACTURER'S BOOK NUMBER OR IDENTIFICATION

DATE OF PUBLICATION to be included at the lower right of page.

SECURITY CLASSIFICATION (See 3.3.3) appears in lower right-hand corner, set in 18 pt. Stymie light caps with Stymie bold numerals.

9999906 2107253 620

RESTRICTED
SECURITY INFORMATION
NAVSHIPS-000-0000

INSTRUCTION BOOK

450-KW A-C/D-C
GENERATOR SET
STEAM-TURBINE-DRIVEN

CL-55 CLASS

WARNING: This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C., Sections 793 and 794. The transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

MANUFACTURER'S NAME AND
ADDRESS

Contract NOBS-00000

MANUFACTURER'S BOOK NUMBER

BUREAU OF SHIPS — NAVY DEPARTMENT — NOVEMBER 1952

RESTRICTED

■ 9999906 2107254 567 ■

FIGURE 3 - TYPICAL CONTENTS PAGE

SECURITY CLASSIFICATION (See 3.3.3) appears in upper right-hand corner with "Security Information" below, set in 12 pt. Futura bold caps. (Security Classification in this case is "Restricted".)

CHAPTER TITLE to appear in upper right-hand corner set in 18 pt. Futura bold caps.

CHAPTER AND NUMBER to be set in 30 pt. Stymie light, upper and lower case.

"DETAILED DESCRIPTION" to be set in 14 pt. Stymie light caps.

"LIST OF SECTIONS" and "PAGE NO." to be set in 10 pt. Stymie light caps.

THE LISTING OF SECTIONS (number, name, and page) to be set in 14 pt. Futura bold, upper and lower case. All of the above materials is to be set as close as possible in style to that shown with sufficient leading and with the whole text block centered between the rules.

FOLIO NUMBER to appear on trim edge and bottom and to be set in 12 pt. Futura bold.

SECURITY CLASSIFICATION to appear on right-hand side at the bottom and to be set in 12 pt. Futura bold caps.

NOTE.- Girder or Beton light or medium may be substituted for Stymie. Any other Sans Serif type of same weight may be substituted for Futura.

■ 9999906 2107255 4T3 ■

RESTRICTED
SECURITY INFORMATION
DETAILED DESCRIPTION

Chapter 2

DETAILED DESCRIPTION

LIST OF SECTIONS

PAGE NO.

1 Turbine	22
2 Speed Reducing Gear	23
3 Oil System	24
4 A-C Generator	26
5 D-C Generator	29
6 Voltage Regulator Equipment	32
7 Air Circuit Breaker	40

RESTRICTED

■ 9999906 2107256 33T ■

RESTRICTED
SECURITY INFORMATIONTitle of Publication - Upper corner left-hand pages
14 pt. Futura medium caps.

450 - KW A-C/D-C GENERATOR SET, STEAM-TURBINE-DRIVEN

SECTION 1

18 pt. Stymie medium caps.

1 pica

18 pt. Stymie medium upper
and lower case.

Description of Turbine

(Give complete name plate data as part of the title of description of turbine,
reduction, etc.)

The general arrangement of the set is shown in Fig. 4. The turbine and pinion shafts are rigidly connected and supported by three bearings, two in the reduction-gear casing and one at the exhaust end of the turbine.

Primary Subheads—14 pt. Futura extra bold caps centered. **ROTOR**

The bucket wheels, shaft, coupling flange, and balancing rings are all integral, being machined from a solid alloy steel forging. The pinion is bolted on one end of the turbine rotor and the emergency governor on the other. The rotor, complete with buckets, is balanced statically and dynamically at the factory.

1 pica

Balancing Rings

6 pt. space

The coupling flange of the rotor is tapped on its outer periphery for radial balancing plugs. See photograph below. At the exhaust end, the shaft carries another integrally forged balancing ring, tapped for axial balancing plugs.

DYNAMIC BALANCING. Adjustment of the rotor for dynamic balance is accomplished by the insertion at the proper points in these rings of balancing plugs of the correct weight. The plugs, when threaded into their holes, are drawn flush with the outer shoulder, and the outer thread of the hole is staked over. See Fig. 31, page 26, for generator balancing rings.

All of the holes are filled initially with one-half inch screw plugs to minimize windage loss, and the balancing plugs are substituted where necessary. These plugs provide an accessible means of balancing when rebucketing the rotor. During inspection periods it is advisable to inspect all plugs to see that they are tight.

Buckets

The buckets on all the wheels are of corrosion-resisting steel, and are attached by T-head dovetails. The buckets are spaced by skirts at the dovetail, machined as an integral part. The buckets are banded together in sections by steel shroud bands riveted onto the buckets.

FIGURE 4. TYPICAL TEXT PAGE

A typical text page spread is shown here with type and spacing specifications noted. New sections may be started near the bottom of the page if the space allows a minimum of three lines of type in each column; tabulated matter may be run two columns or one column.

Fig. 4.- Turbo-generator set as seen from turbine end, throttle-valve side

Classification—Inner bottom corner, 12 pt.
Futura bold caps.

RESTRICTED

9999906 2107257 276

RESTRICTED

Chapter Heading—Upper right-hand corner
of right-hand pages, 14
pt. Futura medium caps.

DETAILED DESCRIPTION

1 pt. rule

1 pica

1 pica

A shroud band of corrosion-resisting steel extends completely around the outer circumference of the buckets on each wheel. This band closes over the tops of the buckets and, by projecting slightly on each side of the buckets, aids in preventing steam leakage over the tops of the wheels.

The low-pressure end of the rotor carries an emergency governor assembly. The housing of the assembly is machined to receive a ratchet wrench for turning the rotor by hand. A wrench for this purpose is furnished with the units.

NOZZLE PLATE

The cast steel first-stage nozzle plate (3), Fig. 2, is bolted to and caked in the upper half of the high-pressure head. The nozzle plate contains a series of

reamed nozzles opening into ports on the high-pressure side.

Nozzle Diaphragms

The five nozzle diaphragms are made of steel with welded corrosion-resisting steel nozzle partitions.

Secondary Subheads—14 pt. Futura extra bold upper and lower case, flush left.

Mounting Because of the high steam temperature at the inlet end of the casing, the second-stage diaphragm is supported at the center line to allow for radial expansion.

SECOND-STAGE DIAPHRAGM. The lower half of the second-stage diaphragm is further positioned by the centering dowel (7) in the bottom of the casing. Crush pins (4) around the periphery of the diaphragm assist in holding both halves securely in place.

2½ picas

SECTION 2

Description of Speed Reducing Gear

2 picas

The reducing gear is the single-reduction, single-helical type, and reduces the turbine speed of 10,059 r. p. m. to the generator speed of 1,200 r. p. m.

PINION

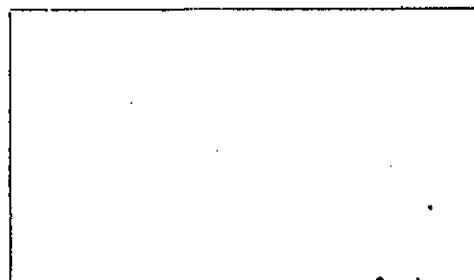
The pinion is forged integral with the shaft. One end of the shaft is provided with a flange that bolts rigidly to the turbine shaft and through which one end of the turbine rotor is supported. The other end of the pinion shaft has an extension, on which is assembled the thrust bearing. The complete assembly is shown in Fig. 6.

GEAR WHEEL

The gear wheel is a steel forging and is pressed and keyed on a forged steel shaft. One end of the gear shaft is solidly coupled to the generator shaft, and part of the weight of the generator rotor is carried by the gear bearing at that end. The turbine end of this shaft is extended to carry the spiral gear that drives the oil pump and the governor.

GEAR CASING

The gear casing consists of two halves which are jointed at the horizontal center line of the rotors. The bearing seats for supporting the gear and pinion bearings, the oil pump seating, and the supports for the high-pressure end of the turbine are fabricated integral with the lower half of the casing.



6 pt. space

FIG. 5—View of the pinion showing half of the solid coupling, which is bolted to the turbine rotor

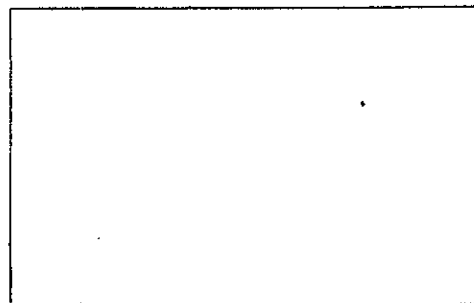


FIG. 6—Reducing gear with upper half casing removed showing the pinion and gear wheel assembled in their operating positions. Captions—Italic of text.

Folio—Outer bottom corner, 12 pt.

RESTRICTED

■ 9999906 2107258 102 ■

RESTRICTED

SECURITY INFORMATION

MODEL GSB-8 DIESEL ENGINE**FIGURE 5. TYPICAL GATEFOLD
OR FOLD-IN PAGES**

The following two pages illustrate correct style that may be followed in gatefold pages where oversize illustrations of blue-prints are to be used. Fold-over pages, double, or triple pages will be permitted only for illustrations where essential to insure legibility.

ENGINE THROTTLE CONTROL**DESCRIPTION**

The engine throttle control system is made up of a series of linkages which, in direct connection with a hydraulic system, enable the operator to start and operate the engine at any required speed. (Fig. 3.) For complete understanding the following description is essential:

1. A mechanical linkage sets the limit to which fuel can be injected.
2. The engine throttle control sets the operating fuel pressure of the fuel pump.
3. A mechanical linkage from the control governor operates the control shaft which is coupled to the fuel injectors.
4. The hydraulic system, in conjunction with the linkage system, operates the control governor regulator shaft.
5. The throttle control operates the limit switch which controls the electrical circuit of the brake on the propeller shaft; just aft of the reduction gear.

The engine throttle control system is actuated by the movement of the throttle lever, or handle, of the hydraulic transmitter, which is located on the after side of the engine control box. (Fig. 1.) When the throttle lever is in the extreme out position, the hydraulic transmitter and receiver units are synchronized. (This function will be explained in detail later in this section.)

As the throttle handle is moved inward, beyond the synchronizing stage, it reaches the point where, for a few degrees of travel, it operates the air starting system (Section 20). When the air starting system is functioning, no fuel is admitted into the cylinders; however, at the instant when the throttle handle is moved farther inward and the air starting valve is released, fuel oil is

then injected into the cylinders, and the engine begins to operate under its own power. Continuing the inward movement of the throttle handle increases the amount of fuel oil which is injected into the cylinders, and thereby increases the speed and power of the engine (Section 4).

The serrated shaft of the transmitter is linked with the throttle shaft which, in turn, is directly linked with the throttle lever tube. The throttle shaft is supported in two bronze bearings which are bolted to pads on the cylinder block, just below the camshaft trough. (Fig. 3.)

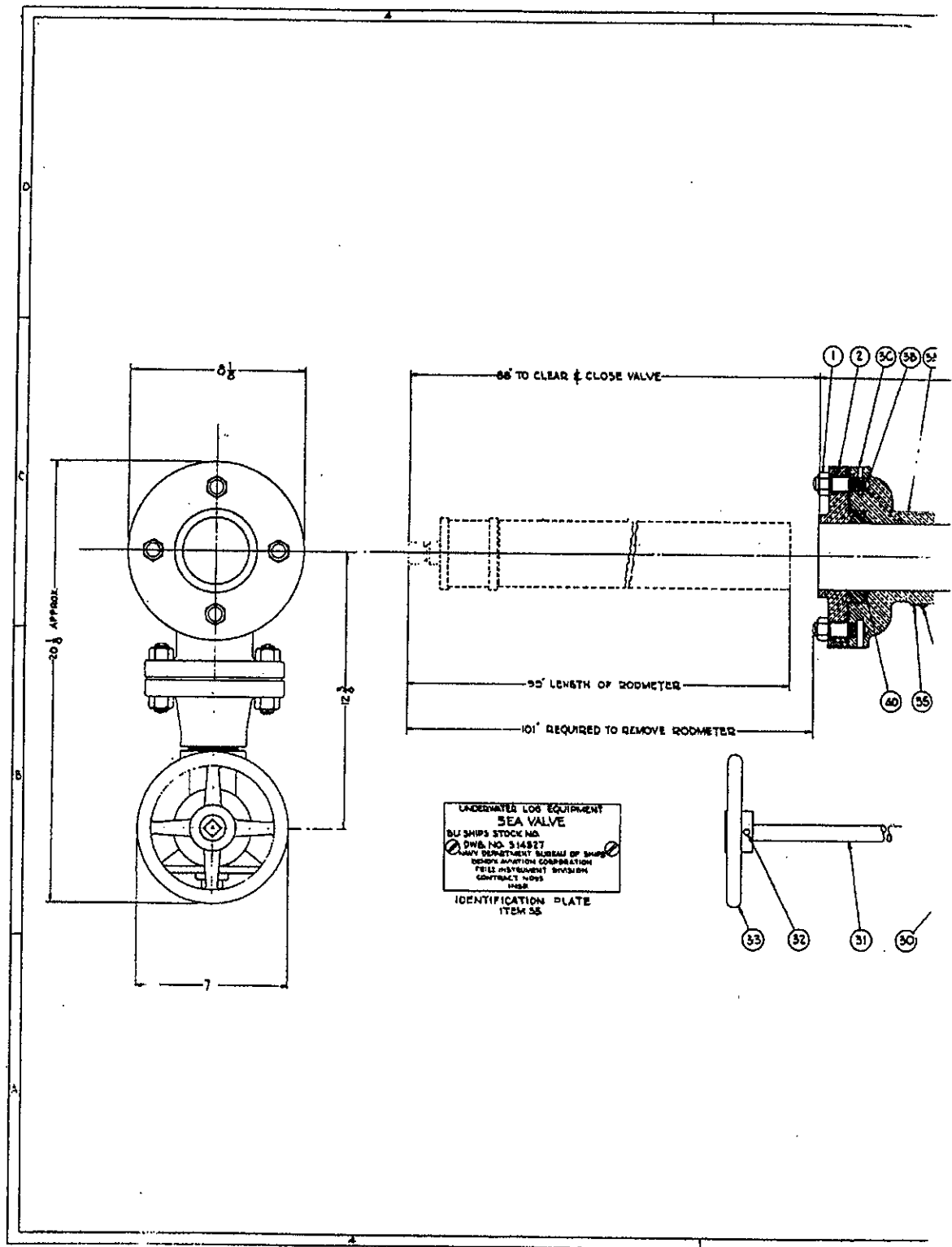
The throttle lever tube floats on the control shaft, and a lever attached to it is connected with the regulating adjusting lever of the fuel oil pump. A spring loaded piston and cylinder assembly is built into the regulating adjusting lever, and its function is to permit the throttle shaft to pass through the synchronizing and air starting stages without moving the fuel pump pressure regulating lever. This permits the regulating lever to be moved from its idling position to maximum engine load position.

A pin lever, welded to the throttle lever tube, sets a position beyond which the control lever on the control shaft cannot advance. Therefore, the control lever cannot be advanced beyond the throttle setting, and no additional fuel oil will be injected into the cylinders until the throttle is advanced farther. The control lever rides on the pin lever of the throttle lever tube, unless the automatic function of the governor tends to hold it away from the pin lever.

The two fuel injectors are synchronized and are coupled by the intermediate control shaft. The after fuel injector is coupled to the control shaft, which is supported at the opposite end by a ball bearing in a bracket attached to the camshaft gear cover.

RESTRICTED

9999906 2107259 049



9999906 2107260 860

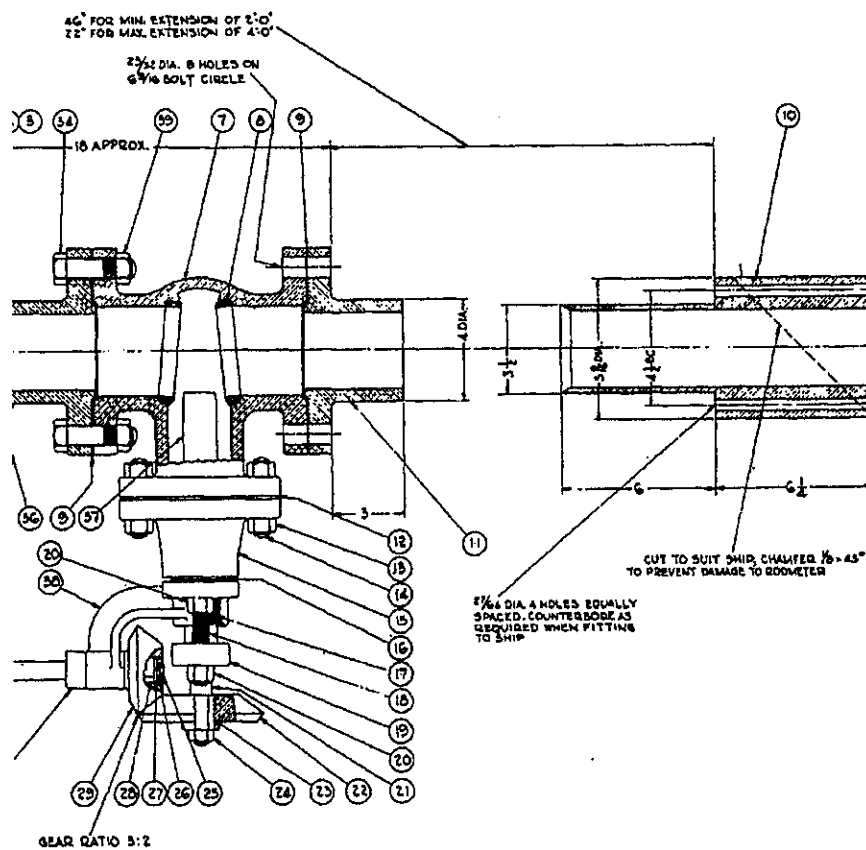


Figure 5a.

9999906 210726J 7T7

LIST OF MATERIAL QUANTITIES FOR ONE SEA VALVE										REVISIONS	
ITEM NO.	NAME OF PIECE	NO. REQ.	MATERIAL	MTL. SPEC.	CONTRACTOR	MANUFACTURER	QUANTITY	UNIT	REMARKS	REV.	DESCRIPTION
1	NUT, HEX. 3/8-11	4	MONEL	46-M-1	81730H						
2	ISLAND	1	MONEL	46-M-1	81740A						
3	RETENTION ASSEMBLY	1	MONEL	46-M-1	81740A						
4	EXTENSION VALVE	1	BRONZE	46-B-8	81740A						
5	STUD	4	MONEL	46-M-1	81740A						
6	PIN, GROOVED	4	STEEL	46-S-1	81740A						
7	BODY VALVE	1	BRONZE	46-B-8							
8	INSERT VALVE SEAT	2	MONEL	46-M-1							
9	GASKET	1	RUBBER	46-R-1	81740A						
10	BEARING, HULL	1	BRONZE	46-B-8	81740A						
11	SPOUT	1	BRONZE	46-B-8	81740A						
12	GASKET	1	RUBBER	46-R-1							
13	NUT, HEX.	10	MONEL	46-M-1							
14	STUD	8	MONEL	46-M-1							
15	COUPLER	1	BRONZE	46-B-8							
16	GASKET	1	RUBBER	46-R-1							
17	PLUNGER	2	BRASS	46-B-1							
18	STUD	2	MONEL	46-M-1							
19	ISLAND	1	MONEL	46-M-1							
20	NUT	4	MONEL	46-M-1							
21	STEM VALVE	1	MONEL	46-M-1							
22	SEAL, BRVCL	1	BRASS	46-B-1							
23	KEY, MACHINE	1	MONEL	46-M-1							
24	NUT, HEX.	1	MONEL	46-M-1							
25	SCREW MACHINE 1/2-20	1	MONEL	46-M-1							
26	WASHER LOCK	1	STEEL	46-S-1							
27	WASHER	1	BRASS	46-B-1							
28	KEY, MACHINE	1	MONEL	46-M-1							
29	BEAM, BEVEL	1	BRASS	46-B-1							
30	COUPLER, SHUNT	1	BRASS	46-B-1							
31	SHUNT, PINION	1	BRASS	46-B-1							
32	PIN, DOWEL	1	BRASS	46-B-1							
33	HANDWHEEL	1	BRASS	46-B-1							
34	BOLT, MACH. 1/2-20	6	MONEL	46-M-1	81740A						
35	PLATE, IDENTIFICATION	1	MONEL	46-M-1	81740A						
36	SCREW, MACH 1/2-20	2	BRASS	46-B-1							
37	DISK VALVE	1	MONEL	46-M-1							
38	BRACKET	1	BRONZE	46-B-8							
39	NUT, HEX. 3/8-10	6	MONEL	46-M-1	81740A						
40	SEA, WATER	1	RUBBER	46-R-1	81740A						

NOTES

1. PINION SHUNT, ITEM 31, IS FURNISHED 36" LONG (FROM 1/2" OF VALVE) LENGTH TO BE CUT TO SUIT SHIP AND HANDWHEEL FINISHED IN PLACE. NECESSARY BEARING FOR SHUNT TO BE FURNISHED BY OTHERS.

2. AT INSTALLATION, ITEM 10 (1) MUST BE THOROUGHLY HELD IN ALIGNMENT.

3. WHERE SPEC. NO. IS NOT NOTED, MATERIAL OF BEST COMMERCIAL GRADE TO BE USED.

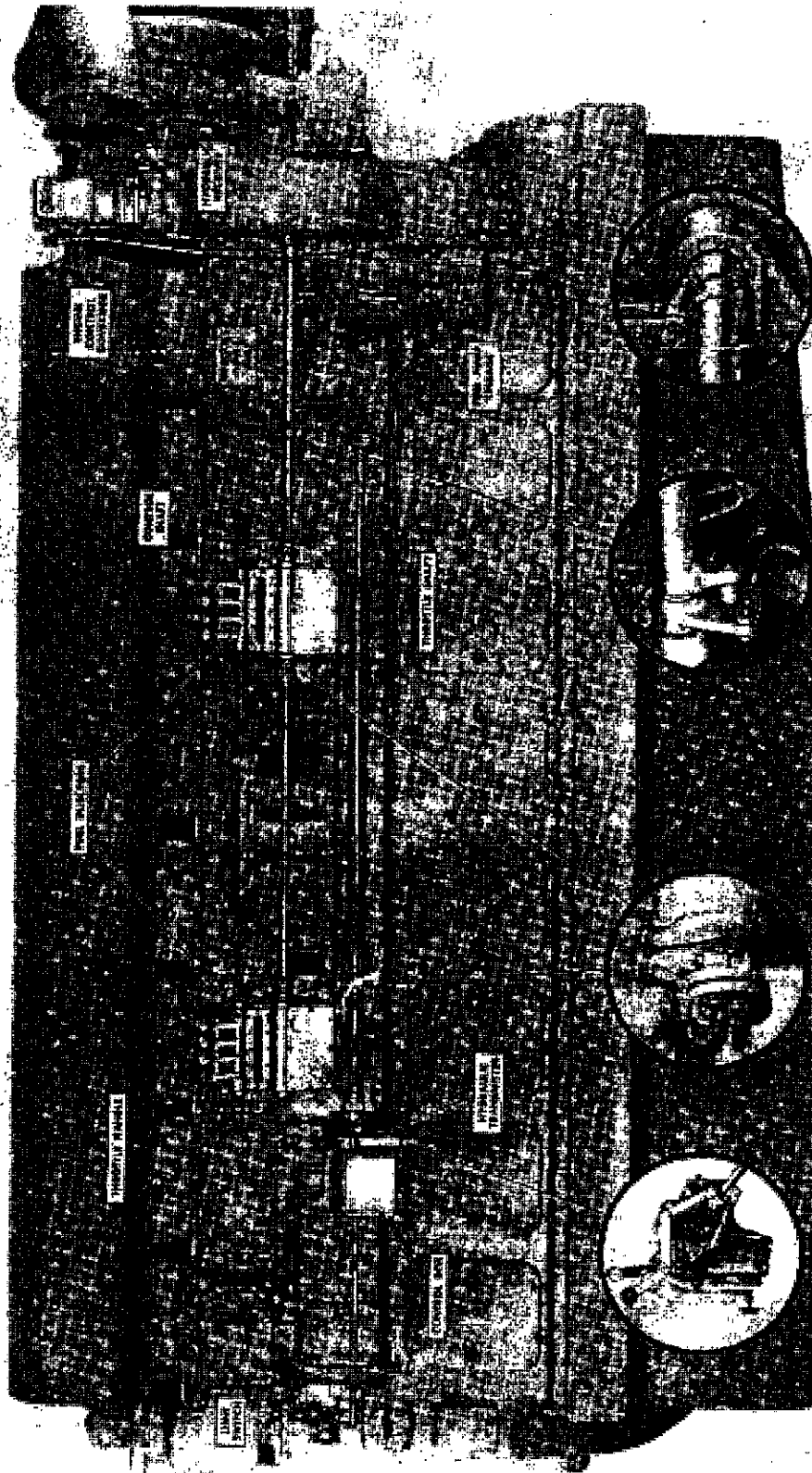
4. VALVE MADE IN ACCORDANCE WITH NAVY SPEC. 45-Y-17 CLASS III EXCEPT AS NOTED.

5. COMPONENTS EXPOSED TO HYDROSTATIC PRESSURE SHALL WITHSTAND WITHOUT DAMAGE OR OPERATIONAL FAILURE HYDROSTATIC PRESSURE OF 130 LBS. PER SQ. INCH FOR ONE HOUR.

MASTER PLAN
UNDERWATER LOG
EQUIPMENT
(IMPELLER TYPE)
SEA-VALVE ASSEMBLY
BY SHIP'S LOG
SCALE 6-1" UNIT WT. 255LBS

RENDU ANTON CORPORATION
1001 WESTERN BOULEVARD
SAN FRANCISCO, CALIF. 94109
PHONE 814-2777
TELETYPE 814-2777
FAX 814-2777
CONTRACT NO. 47766
SHEET NO. 1
56505 H-3002712

9999906 2107262 633

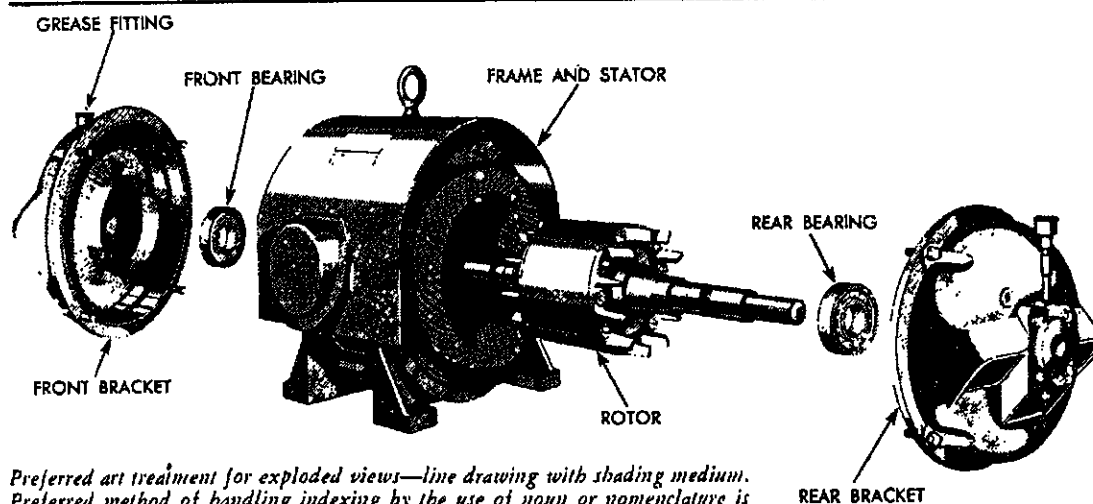


RESTRICTED

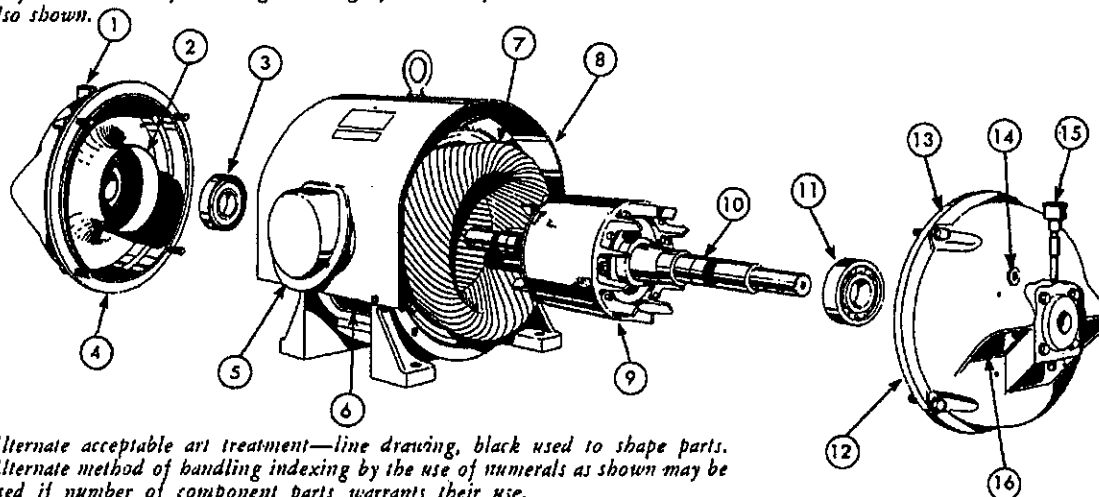
Figure 5b.- Engine Control System.

■ 9999906 2107263 57T ■

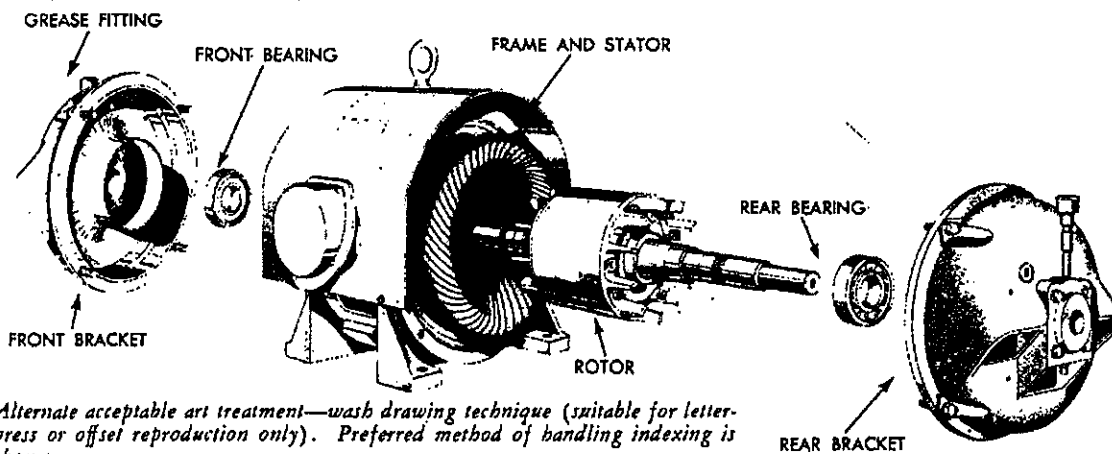
ART TREATMENT FOR EXPLODED VIEWS



Preferred art treatment for exploded views—line drawing with shading medium. Preferred method of handling indexing by the use of noun or nomenclature is also shown.



Alternate acceptable art treatment—line drawing, black used to shape parts. Alternate method of handling indexing by the use of numerals as shown may be used if number of component parts warrants their use.



Alternate acceptable art treatment—wash drawing technique (suitable for letterpress or offset reproduction only). Preferred method of handling indexing is shown.

NOTE.—Where letterpress or offset reproduction is to be employed, well-retouched photographs, exploded as per drawing shown above will also be acceptable.

Figure 6.

9999906 2107264 406

FIGURES 7 AND 8

These figures show approved style to be followed on manuals which are to be typewritten, varityped, or set with the electric typewriter. All copy should be prepared to allow for a 15- or 20-percent reduction in size.

9999906 2107265 342

TITLE OF BOOK

MFR'S NUMBER

PART I

DESCRIPTION OF TURBINE AND GEAR

GENERAL ARRANGEMENT

The design of the turbine and arrangement of the main parts are shown in the assembly drawing, Fig. 2. The turbine, as well as the gear and generator, is mounted on a rigid steel base as indicated in the outline, Fig. 1. The exhaust end of the turbine is carried from the base on

vertical supports which are rigid in a cross-axis direction but are flexible in an axial direction thereby allowing for axial expansion of the turbine casing under load conditions. The high-pressure end of the turbine is bolted rigidly to the gear casing.

SECTION I

DESCRIPTION OF TURBINE

The throttle valve is provided with both a hand-wheel for manual control and an emergency tripping device. The throttle valve will be tripped closed automatically by an emergency governor.

Fig. 2, is bolted to and caulked in the upper half of the high pressure head. The nozzle plate contains a series of reamed nozzles opening into ports on the high-pressure side.

ROTOR AND BUCKETS

The turbine rotor (1), Fig. 2, consisting of shaft, bucket wheels, and coupling, is machined from a solid steel forging. The coupling flange of the rotor is tapped around its outer periphery for balancing plugs.

The throttle valve is provided with a handwheel for manual control and an emergency tripping device. The throttle valve will be tripped closed automatically by an emergency governor.

Buckets

The buckets of all six wheels are made of corrosion-resisting steel. They are secured to the periphery of each wheel by dovetails. The spacing of the buckets around the wheels is determined by skirts at the dovetails. The skirts form a part of the buckets.

A shroud-band of corrosion-resisting steel extends completely around the outer circumference of the buckets on each wheel. This band closes over the tops of the buckets and, by projecting slightly on each side of the buckets, aids in preventing steam leakage over the tops of the wheels.

The low-pressure end of the rotor carries an emergency governor assembly. The housing of the assembly is machined to receive a ratchet wrench for turning the rotor by hand. A wrench for this purpose is furnished with the units.

NOZZLE PLATE

The cast steel first-stage nozzle plate (3),

NOZZLE DIAPHRAGMS

The nozzle diaphragms are made of steel corrosion-resisting steel nozzle partitions. The diaphragm five nozzle diaphragms are made of steel with welded corrosion-resisting steel nozzle partitions.

Mounting

Because of the high steam temperature at the inlet end of the casing, the second-stage diaphragm is supported at the centerline to allow for radial expansion.

SECOND STAGE DIAPHRAGM: The lower half of the second stage diaphragm is further positioned by the centering dowel (7) in the bottom of the casing. Crush pins (4) around the periphery of the diaphragm assist in holding both halves securely in place.

LOCATION OF DIAPHRAGMS: The other four diaphragms, which are located in the exhaust casing are mounted as shown in Fig. 3b. The cast steel first-stage nozzle plate (3), Fig. 2 is bolted to and caulked in the upper half of the high pressure head.

The first stage is drained through a valve at the bottom of the casing.

TURBINE CASING

The turbine casing consists of a steel high-pressure head (4), Fig. 2, and a steel exhaust casing.

Figure 7.

9999906 2107266 289

MFR'S NUMBER

TITLE OF BOOK

PART 1DESCRIPTION OF TURBINE AND GEARGENERAL ARRANGEMENT

The design of the turbine and arrangement of the main parts are shown in the assembly drawing, Fig. 2. The turbine, as well as the gear and generator, is mounted on a rigid steel base as indicated in the outline, Fig. 1. The exhaust end of the turbine is carried from the base on vertical supports which are rigid in a cross-axis direction but are flexible in an axial direction thereby allowing for axial expansion of the turbine casing under load conditions. The high-pressure end of the turbine is bolted rigidly to the gear casing.

SECTION 1DESCRIPTION OF TURBINE

The throttle valve is provided with both a handwheel for manual control and an emergency tripping device. The throttle valve will be tripped closed automatically by an emergency governor.

Rotor and Buckets

The turbine rotor (1), Fig. 2, consisting of --
chined from a solid steel forging. The coupli-
outer periphery for balancing plugs.

The throttle valve is provide-
tripping device. The throttle
governor.

THIS PAGE WAS TYPED USING STANDARD
ELITE TYPE, REDUCED 15%

els, and coupling, is ma-
is tapped around its

val for manual control and an emergency
closed automatically by an emergency

Buckets

The buckets of all six wheels are made of corrosion-resisting steel. They are secured to the periphery of each wheel by dovetails. The spacing of the buckets around the wheels is determined by skirts at the dovetails. The skirts form a part of the buckets.

A shroud-band of corrosion-resisting steel extends completely around the outer circumference of the buckets on each wheel. This band closes over the tops of the buckets and, by projecting slightly on each side of the buckets, aids in preventing steam leakage over the tops of the wheels.

The low-pressure end of the rotor carries an emergency governor assembly. The housing of the assembly is machined to receive a ratchet wrench for turning the rotor by hand. A wrench for this purpose is furnished with the units.

Nozzle Plate

The cast steel first-stage nozzle plate (3), Fig. 2, is bolted to and caulked in the upper half of the high pressure head. The nozzle plate contains a series of reamed nozzles opening into ports on the high-pressure side.

Nozzle Diaphragms

The five nozzle diaphragms are made of steel with welded corrosion-resisting steel nozzle partitions. All of the diagrams five nozzle diaphragms are made of steel with welded corrosion-resisting steel nozzle partitions.

Mounting

Because of the high steam temperature at the inlet end of the casing, the second-stage diaphragm is supported at the centerline to allow for radial expansion.

Figure 8.

■ 9999906 2107267 115 ■

FIGURE 9 - WARNING

Voltages over 300 volts shall be measured as follows;

- (1) Deenergize the equipment. Ground terminals to be measured to discharge any capacitors connected to these terminals.
(See Note F.)
- (2) Connect meter to terminals to be measured using a range higher than the expected voltage.
- (3) WITHOUT TOUCHING METER OR TEST LEADS, energize the equipment and read the meter.
- (4) Deenergize the equipment. Ground the terminals connected to the meter before disconnecting meter.

NOTES:

- (A) MAKE SURE YOU ARE NOT GROUNDED whenever you are adjusting equipment or using measuring equipment.
- (B) In general, USE ONE HAND ONLY when servicing live equipment.
- (C) If test meter must be held or adjusted while voltage is applied, GROUND the case of the meter before starting measurement and DO NOT touch the live equipment or personnel working on live equipment while you are holding the meter. Some moving vane type meters should not be grounded. These should not be held during measurements.
- (D) DO NOT FORGET that high voltages MAY BE PRESENT across terminals that are normally low voltage, due to equipment breakdown. Be careful even when measuring low voltages.
- (E) DO NOT use test equipment known to be in poor condition.
- (F) High voltage high capacity capacitors should be discharged with a grounding stick with approximately 10 ohms in series with the grounded line. Where neither terminal of a capacitor is grounded, short capacitor terminals to each other.

Exhibit Q

9999906 2107195 179

MIL-T-15071B(SHIPS)
16 August 1954
SUPERSEDING
MIL-B-15071A(SHIPS)
20 October 1952

MILITARY SPECIFICATION
TECHNICAL MANUALS FOR MECHANICAL
AND ELECTRICAL EQUIPMENT

1. SCOPE

1.1 Scope. - This specification covers technical manual requirements for electrical and mechanical equipment.

1.2 Classification. - Technical manuals shall be of the following types as specified (see 6.1):

- Type A - (Type A manuals may be required where the system or equipment to be described is of a highly specialized or extremely complex nature, and where the importance of the equipment justifies unusual effort in the preparation of the manual.) (See 3.3.)
- Type B - (Type B manuals are required where the equipment or system to be described has no direct commercial counterpart or which is sufficiently complex that a detailed description, and maintenance instructions are required and must be supplemented by sufficient photographs, drawings, parts lists, etc.) (See 3.5.)
- Type C - (Type C manuals are required where the equipment or system to be described is an adaptation or variation of conventional commercial equipment, where with certain modifications and additional data, the type of instructional matter normally furnished will serve the purpose.) (See 3.6.)
- Type D - (Type D manuals are required where the equipment or system to be described is generally the same as equivalent commercial equipment, or is sufficiently simple that standard manufacturer's instruction pamphlets and service data are adequate.) (See 3.7.)

2. APPLICABLE DOCUMENTS

2.1 The following specifications and drawings, of the issue in effect on date of invitation for bids, form a part of this specification:

SPECIFICATIONS

MILITARY

MIL-R-15137 - Repair Parts for Electrical and Mechanical Equipment (Naval Shipboard Use).

NAVY DEPARTMENT

General Specifications for Inspection of Material.

H
GPO-O-NAV-M-99

■ 9999906 2107196 035 ■

MIL-T-15071B(SHIPS)

DRAWINGS

BUREAU OF SHIPS

S0103-73729 - Standard Drawing Format for Production Drawings Prepared by
Contractor or Manufacturer for Approval by Government Agency.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Material. - The minimum material requirements are as specified hereinafter. A good grade material shall be used when a definite material is not specified.

3.2 Distribution required. - Distribution shall be as follows except when identical manuals have been previously distributed to all the addressees:

- (a) Two copies packed with each unit of equipment (for ultimate placement onboard ship) (see 3.4.6).
- (b) Four copies to the Bureau of Ships.
- (c) Two copies to the cognizant Supervisor of Shipbuilding.
- (d) One copy to the cognizant Inspector of Naval Material.
- (e) One copy to the Director, Naval Engineering Experiment Station, Annapolis, Maryland (propulsion machinery and major auxiliary equipment only).
- (f) One copy to the Superintendent, U.S. Naval Academy, Postgraduate School, Monterey, California, (propulsion units and major auxiliary equipment only).
- (g) Two copies to each U.S. Naval Shipyard (except Portsmouth, N.H. - for Military equipment only).
- (h) Two copies to each U.S. Naval Shipyard concerned (for non-Military equipment only).
- (i) Two copies to Portsmouth Naval Shipyard (Submarine equipment only).
- (j) One copy to the Submarine Supply Office, Philadelphia, Pa. (Submarine equipment only).
- (k) Two copies to all Submarine Tenders (Submarine equipment only).
- (l) Six copies to the Commander, Submarine Base, New London, Conn. (Submarine equipment only).
- (m) Manuals for stock shall be specified generally in the following quantities:

<u>Number of equipments</u>	<u>Number of copies</u>
1 to 25	10 plus 2 per equipment
26 to 950	50 plus 2 per equipment
Over 950	100 plus 2 per equipment

Bulk copies of manuals furnished for stock shall be shipped to:

Commanding Officer
Naval Supply Depot
Mechanicsburg, Pennsylvania
"For SPCC stock"

- (n) In addition to (a) through (m) above, the shipbuilder shall provide technical manuals for selected components and systems in the following minimum quantities to the Fitting Out Activity for placement onboard the ship:

	<u>Heavy cruisers and larger type ships</u>	<u>Smaller ships</u>	<u>Small craft and submarines</u>
Engineering piping systems	50	25	5
Propulsion prime movers	10	5	1
Propulsion reduction gears	10	5	1
Boilers, main	10	5	1